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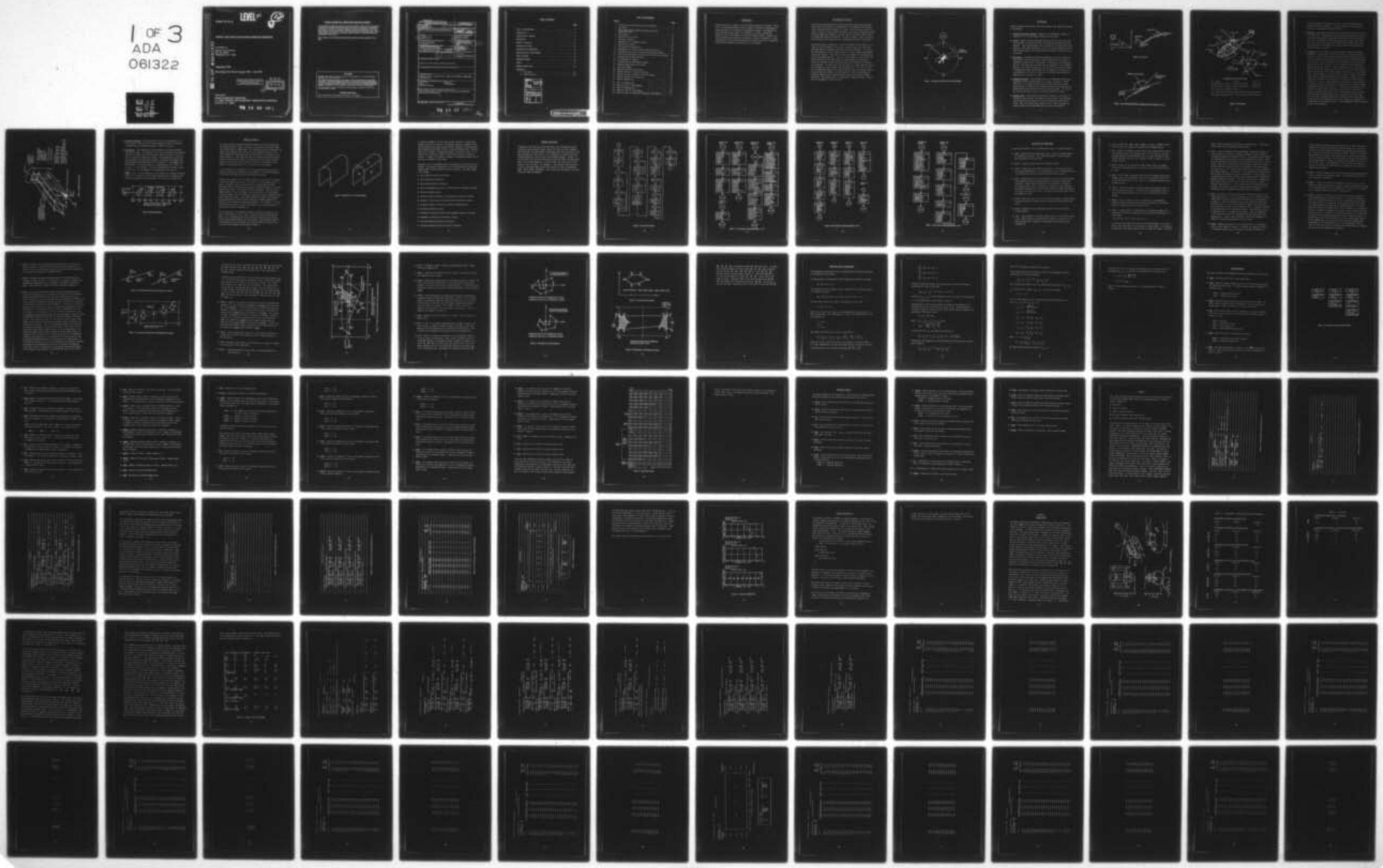

LEVEL II

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CANOPY SUN GLINT EVALUATION COMPUTER PROGRAM

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Prepared for

APPLIED TECHNOLOGY LABORATORY
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Fort Eustis, Va. 23604

APPLIED TECHNOLOGY LABORATORY POSITION STATEMENT

This document and associated computer program will provide a useful tool in the design and development of helicopter canopies that are to have low sun glint signature characteristics. It will permit the rapid and inexpensive evaluation of various configurations in the initial design phase of a new aircraft as well as retrofit configurations for existing aircraft. Results of this program will advance the technology needed to improve combat effectiveness and survivability of Army aircraft.

Earl C. Gilbert of the Aeronautical Systems Division served as project engineer for this effort.

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This document describes a computer program for analytically determining canopy sun glint signatures.

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INTRODUCTION

Canopy sun glint is a major cue in the visual detection of aircraft. Therefore, it would be desirable to have a method to calculate the magnitude of these sun glints for a proposed or experimental canopy. The computer program described in this report is an attempt to provide an analytical method to solve this problem for smooth reflecting surfaces. However, certain limitations were necessary to maintain a degree of simplicity. These limitations, which include the restriction that any section of a reflecting surface have a quadratic representation, are discussed.

DESCRIPTION OF PROBLEM

An aircraft canopy reflects the rays of the sun at azimuth and elevation angles that are a function of the geometry of the canopy and the orientation of the aircraft with respect to the sun. As the aircraft rotates, as shown in Figure 1, the sun glint also moves; and, as the orientation of the aircraft changes with respect to the sun, more or different canopy panels can become the reflecting surfaces. At any one instant, canopy sun glints may be visible at more than one set of azimuth and elevation coordinates.

The objective then in designing a canopy to minimize visual detection is to limit the size and number of sun glints occurring within the band of coordinates which are probable positions for hostile observers. To evaluate the effectiveness of such a design, there is a choice between experimental testing and analysis. There are at least two problems with experimentally testing new canopy designs. First, if a scaled model is used, getting the proper curvature on the panels could be time-consuming and expensive. Second, if a mockup is used, greater distances are required to simulate a real situation. In either case, the evaluation of a large family of curves, or variations of a basic design, would be difficult. This is not to say that an analytical approach is without problems; there are certain limitations that must be imposed. But the simple fact that a large number of different designs can be evaluated rapidly makes the analytical scheme attractive. The problem then is to develop an analytical method to determine the coordinates of the sun glint.

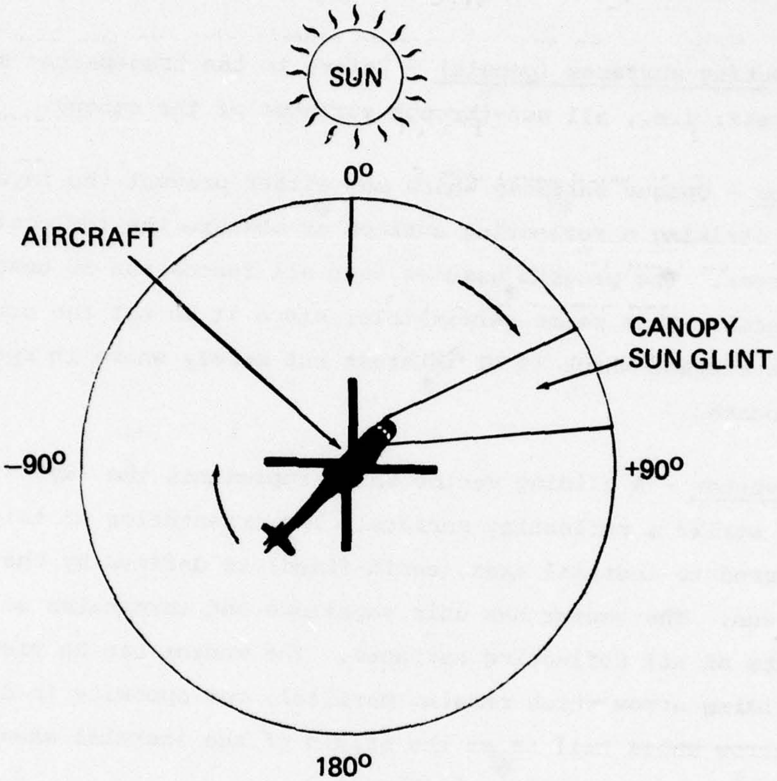


Figure 1. Variation of Sun Glints With Aircraft Heading.

DEFINITIONS

Before proceeding any further with the discussion, some useful definitions are presented:

- Reflecting surfaces (panels) - Refers to the transparent surfaces of interest; i.e., all see-through surfaces of the canopy.

- Fences - Opaque surfaces which may either prevent the rays of the sun from striking a reflecting surface or obscure the reflection from the observer. The program assumes that all fences can be described by flat surfaces. This seems permissible, since it is not the curvature of the fence surface which is of interest but merely where in space the fence is located.

- Sun vector - A sliding vector which represents the rays of the sun as they strike a reflecting surface. The orientation of this vector as referred to inertial axes (earth-fixed) is defined by the elevation of the sun. The vector has unit magnitude and terminates at all boundary points of all reflecting surfaces. The vector can be viewed as simply a sliding arrow which remains parallel, but opposite in direction, to an arrow whose tail is at the origin of the inertial axes and points toward the sun, as shown in Figure 2.

- Reflection vectors - Each boundary point on a reflecting surface has a reflection vector associated with it, as shown in Figure 3. Mathematically, it is formed by taking the sun vector and retaining the portion which is tangent to the reflecting surface while reversing the portion which points toward the surface along the normal. As the normal varies from point to point, so does the reflection vector.

- Inertial axes - Earth-fixed axis system with origin at the center of rotation of the aircraft. The positive X axis points in the direction of the sun while the positive Z axis points away from the center of earth. The Y axis forms right angles with the X and Z axes and has positive sense to the right when facing the sun (see Figure 4).

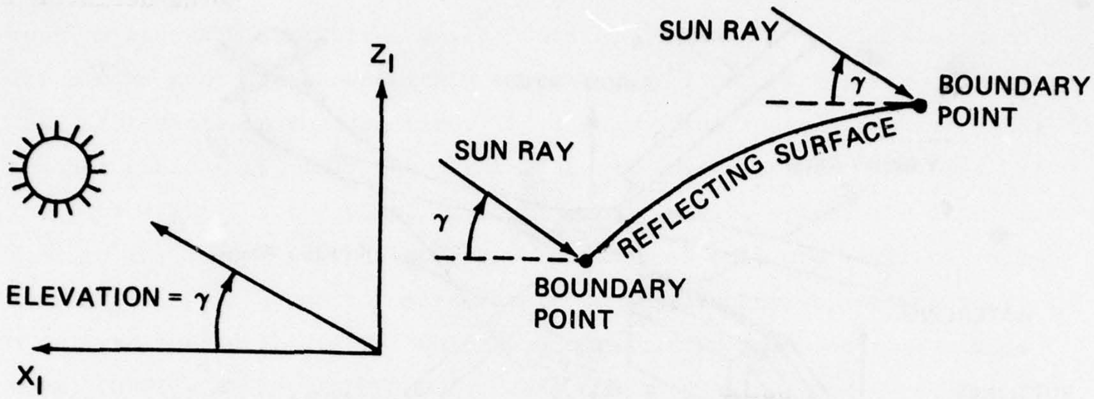


Figure 2. Sun Vector.

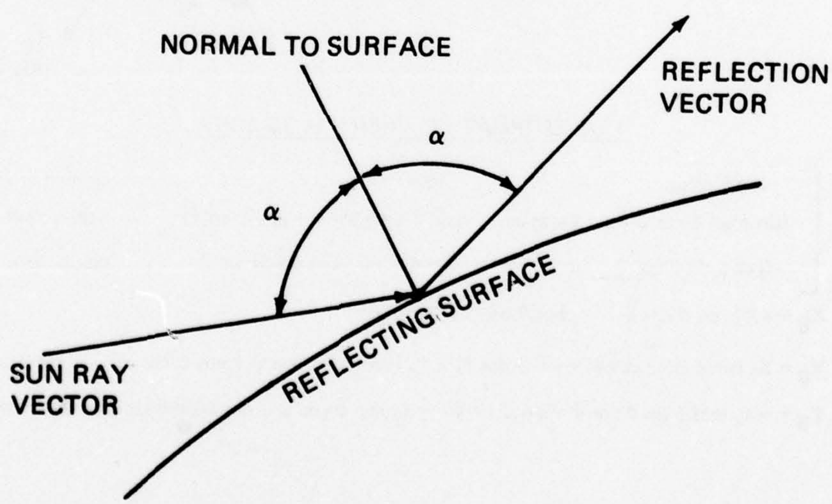
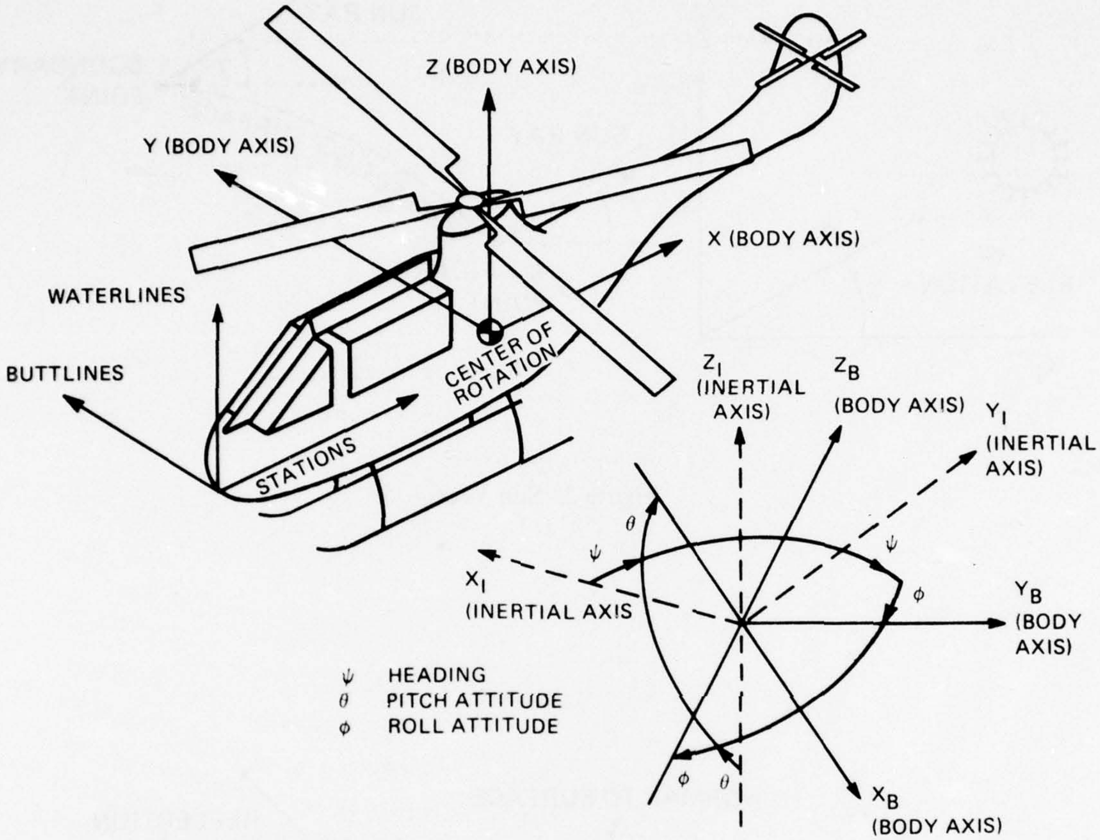


Figure 3. Basic Relationship Between Striking Sun Ray and Reflection Vector.



TRANSFORMATION: INERTIAL TO BODY

$$\begin{bmatrix} -\cos\theta\cos\psi & -\cos\theta\sin\psi & -\sin\theta \\ (\sin\phi\sin\theta\cos\psi - \sin\psi\cos\phi) & (\sin\phi\sin\theta\sin\psi + \cos\psi\cos\phi) & -\sin\phi\cos\theta \\ -(\cos\phi\sin\theta\cos\psi + \sin\psi\sin\phi) & (\sin\phi\cos\psi - \cos\phi\sin\theta\sin\psi) & \cos\phi\cos\theta \end{bmatrix}$$

$$X_B = -X_I\cos\theta\cos\psi - Y_I\cos\theta\sin\psi - Z_I\sin\theta$$

$$Y_B = X_I(\sin\phi\sin\theta\cos\psi - \sin\psi\cos\phi) + Y_I(\sin\phi\sin\theta\sin\psi + \cos\psi\cos\phi) - Z_I\sin\phi\cos\theta$$

$$Z_B = -X_I(\cos\phi\sin\theta\cos\psi + \sin\psi\sin\phi) + Y_I(\sin\phi\cos\psi - \cos\phi\sin\theta\sin\psi) + Z_I\cos\phi\cos\theta$$

Figure 4. Axis Systems.

Aircraft headings are measured relative to this axis system and are positive as shown in Figure 1. Sun glint position is also measured relative to these axes as shown in Figure 5.

- Body axes - Body-fixed axis system with origin at the center of rotation of the aircraft. The positive X axis points toward the tail of the aircraft while the positive Z axis points toward the top of the aircraft. The Y axis is positive out the right side of the aircraft and, along with the X and Z axes, forms an orthogonal system. These axes are assumed parallel to the station line, buttline, and waterline reference system as shown in Figure 4.

- Sun glints - In this report, a sun glint refers to the single image produced by one reflective surface for one set of aircraft and sun positions. If the reflection vectors are extended, as shown in Figure 5, until they intersect an imaginary cylinder in space, the image produced is a sun glint. The whole thing can be visualized as if the aircraft were sitting in the center of a circular stadium and the stands were filled with hostile observers. These stands are strictly vertical and form the rim of the stadium. The reflection vector from each boundary point, when extended, will strike someone in the stands. If each person that is struck stands up, the outline of an image is formed. The image formed from the reflection vectors of one reflective surface will be called the sun glint of that surface at the specified aircraft and sun conditions. Since the radius (distance to observers) of the stadium is a fixed input value, the location of any person in the stands is defined completely by specifying two angles. The two angles are measured relative to the inertial axes. To locate a person, first rotate the X inertial axis about the Z axis until it intersects the stands directly below the person (azimuth angle); then rotate the X axis about the Y axis until the X axis points directly at the person (elevation angle). In the same way the boundary points of the sun glint are defined by an azimuth angle and an elevation angle. These coordinates (angles) form the results of this program.

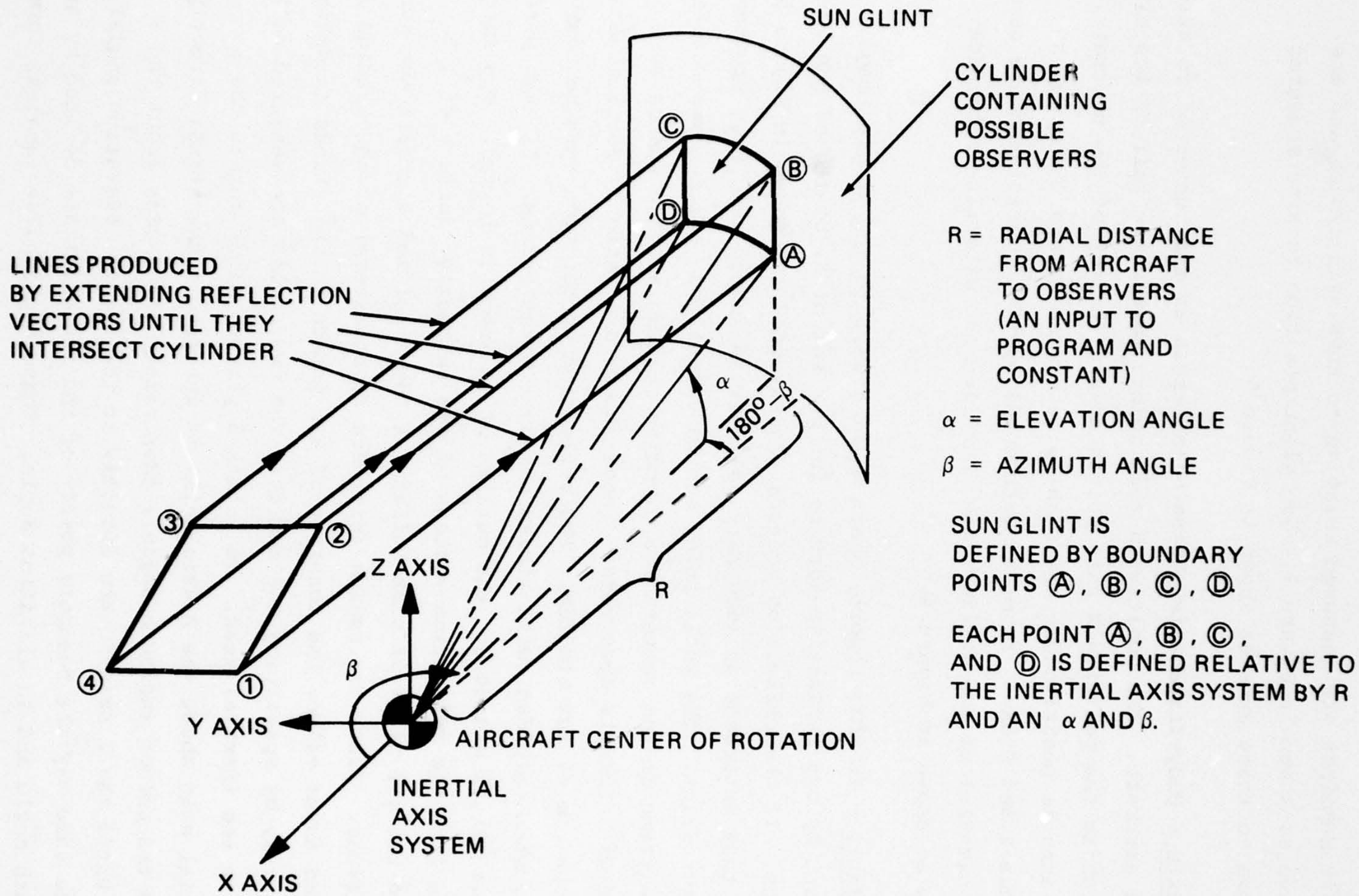


Figure 5. Definition of Sun Glint.

- Sun glint signature - This is the plot of all the coordinates of all the sun glints from all the reflective surfaces for one sun elevation. A sample plot for an imaginary canopy is shown in Figure 6.

- Probability - The probability of being observed is defined to be the ratio of two areas. The numerator is the area within the glint signature plot which is swept out by the reflected canopy sun glints as the aircraft is rotated 360 degrees in heading. The denominator is the total area enclosed by the rectangle formed by the maximum and minimum allowable elevation and azimuth angles of the observer. As an example, consider Figure 6. The area swept out is approximately (135- (-150)) X (5- (-5)) = 2,850 degrees^2. The total allowable area is (180- (-180)) X (10- (-10)) = 7,200 degrees^2. The probability would then be $\frac{2,850}{7,200}$ = 0.396. In the calculation of the swept area, overlap is ignored; that is, if a portion of the sun glint signature plot is covered by the sun glints from more than one surface, the area is only counted once.

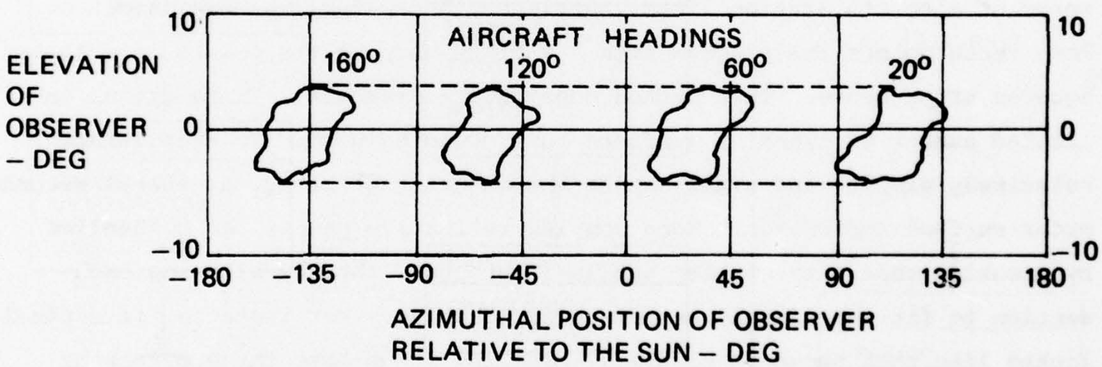


Figure 6. Sun Glint Signature.

METHOD OF SOLUTION

The rays of the sun, treated as parallel vectors, strike the canopy and are reflected by the canopy. The method of solution is basically simple; the trimmings make it complicated. The reflecting surface is assumed to be smooth, and therefore, the reflection vector becomes a function of the angle between the striking sun rays and the normal to the surface, as was shown in Figure 3. This angle may vary as the relative position between the aircraft and the sun varies, for instance, due to aircraft heading changes. It could also vary from point to point on the surface as the normal to the surface varies, as in the case of a curved panel.

It is necessary then to determine at all the boundary points of all the reflective surfaces the normals to those surfaces. One method considered was to input the normals for all the reflective surfaces.

However, these normals are not readily available in most cases. Therefore, an alternate approach was taken. The location of the boundary points in terms of aircraft station lines, buttlines, and waterlines was used. From these points the program fits a surface through the points in a least-squares error sense. This method does have a drawback. There are an unlimited number of types of surfaces that could be used. To keep things relatively simple, and still handle the majority of cases, a general second-order surface was chosen. More complex reflective panels can be handled by breaking them into smaller panels (sections), thereby allowing each section to fit a different second-order equation. For instance, if a panel looked like that shown in Figure 7, breaking it up into three panels as shown should yield an acceptable fit.

Once the equation of the reflective surface is known, the normal at any point on the surface is known. Then, selecting an aircraft orientation (pitch, roll, and heading) and sun elevation, the angle between the sun vector and any surface normal can be calculated. The reflection vector at each boundary point is then known; and from the reflection vectors, the sun glints can be formed, as was shown in Figure 5.

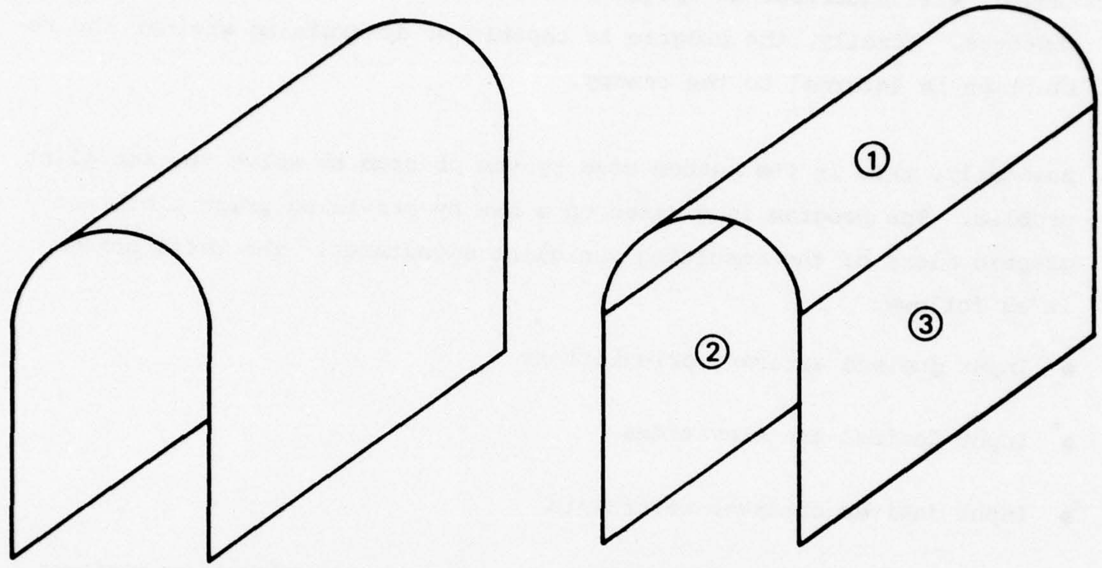


Figure 7. Segmentation of a Compound Surface.

It has been assumed so far that the sun rays are free to strike every boundary point on the surface. The program, however, is capable of determining whether an opaque surface (fence), defined by boundary points, comes between the sun and a reflective surface boundary point. The program is also capable of determining whether a reflection vector, if extended, will intersect an opaque surface before reaching a possible observer. Finally, the program is capable of determining whether the reflection is internal to the canopy.

Basically, this is the method used by the program to solve the sun glint problem. The program is dressed up a bit by providing print plots and graphic plots of the resulting sun glint signatures. The total scheme is as follows:

- Input desired aircraft orientations
- Input desired sun elevations
- Input desired observer restraints
- Input the boundary points for all fences and all reflective surfaces
- Curve-fit boundary points
- Calculate relative position of sun vector and reflective surface
- Determine if any fences lie between sun and reflective surface
- Calculate normals to reflective surface at boundary points
- Calculate reflection vectors
- Determine if reflection vectors when extended intersect any fences
- Determine if reflection is internal to canopy
- Calculate observer positions (sun glints)
- Calculate probabilities from sun glint signatures.

PROGRAM FLOW CHARTS

Presented in this section are the flow charts for the executive (main) routine and each subroutine which contains at least one CALL statement. The blocks that are shown within a particular flow chart refer only to the CALL statements in that routine. If a subroutine is called which calls another subroutine, only the first CALL statement appears. However, in the flow chart for the first subroutine called will appear the CALL statement to the second subroutine. In other words, only one level of calls appear in any flow chart. For example, in the executive routine there is a call to subroutine CFITF, which would result in calls to subroutines NORM, CURFIT, SIGNF, AND EQNSOL. This can be seen by looking at the flow charts for CFITF and CURFIT.

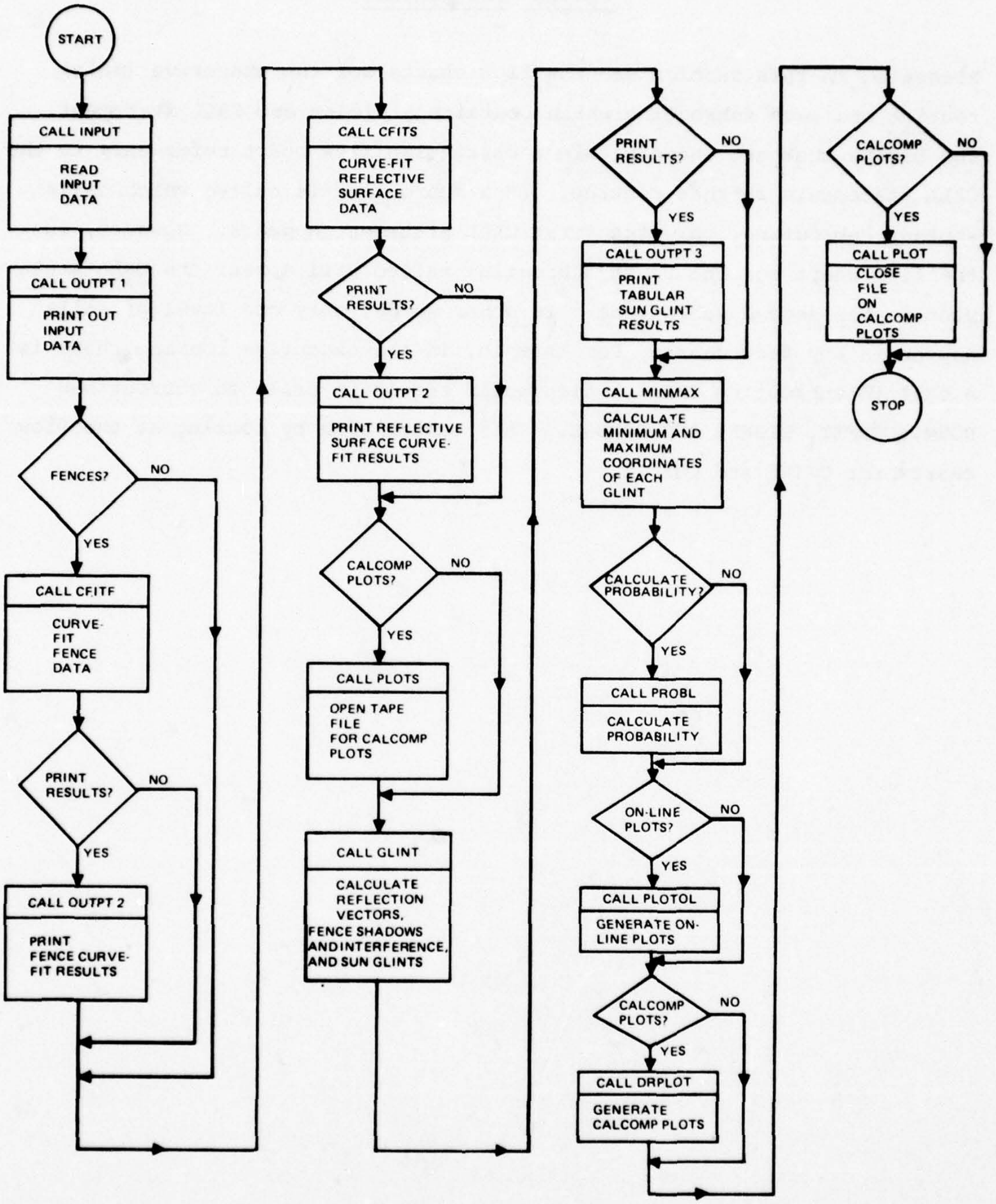


Figure 8. Executive Flow Chart

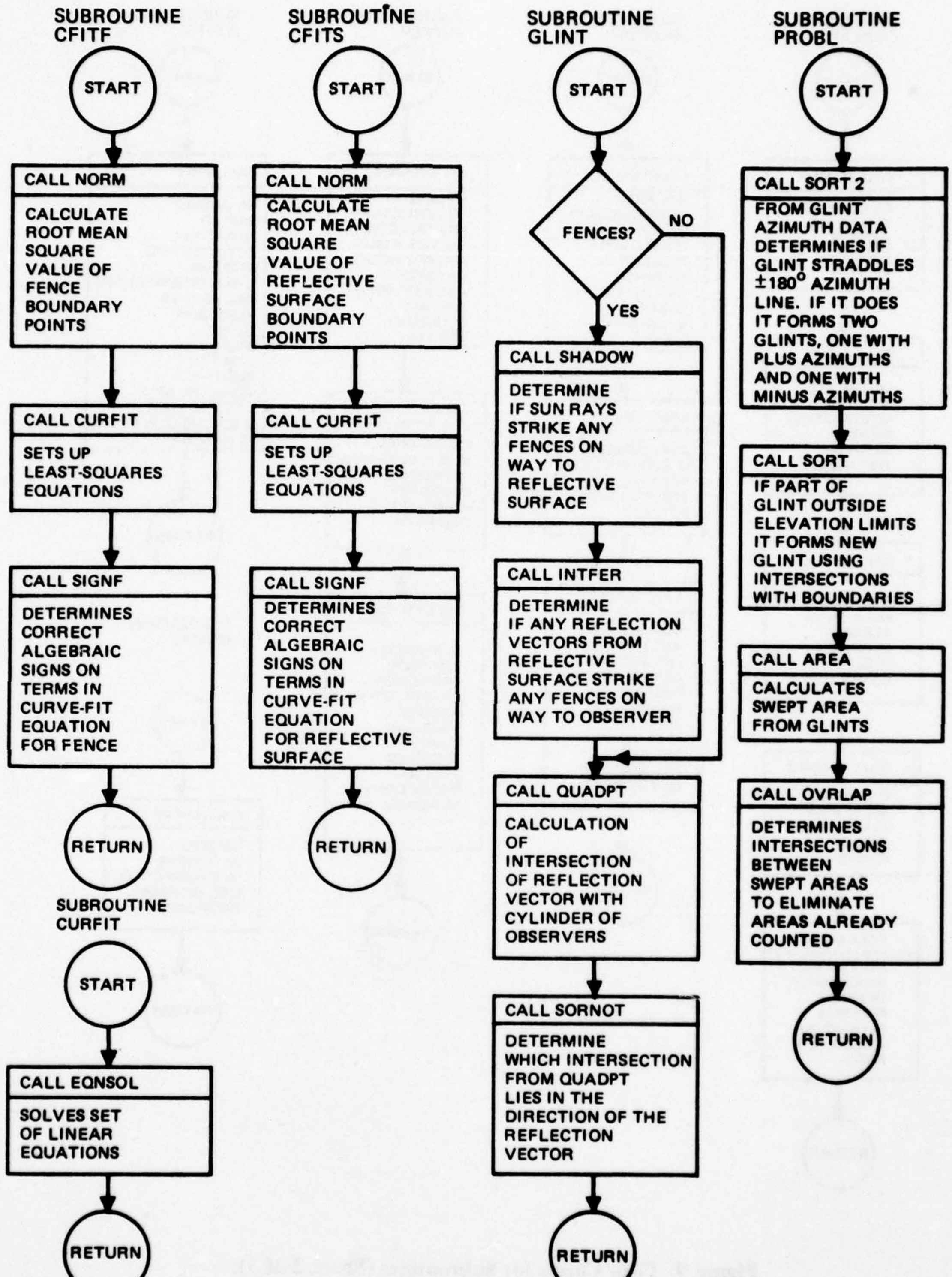


Figure 9. Flow Charts for Subroutines (Sheet 1 of 3).

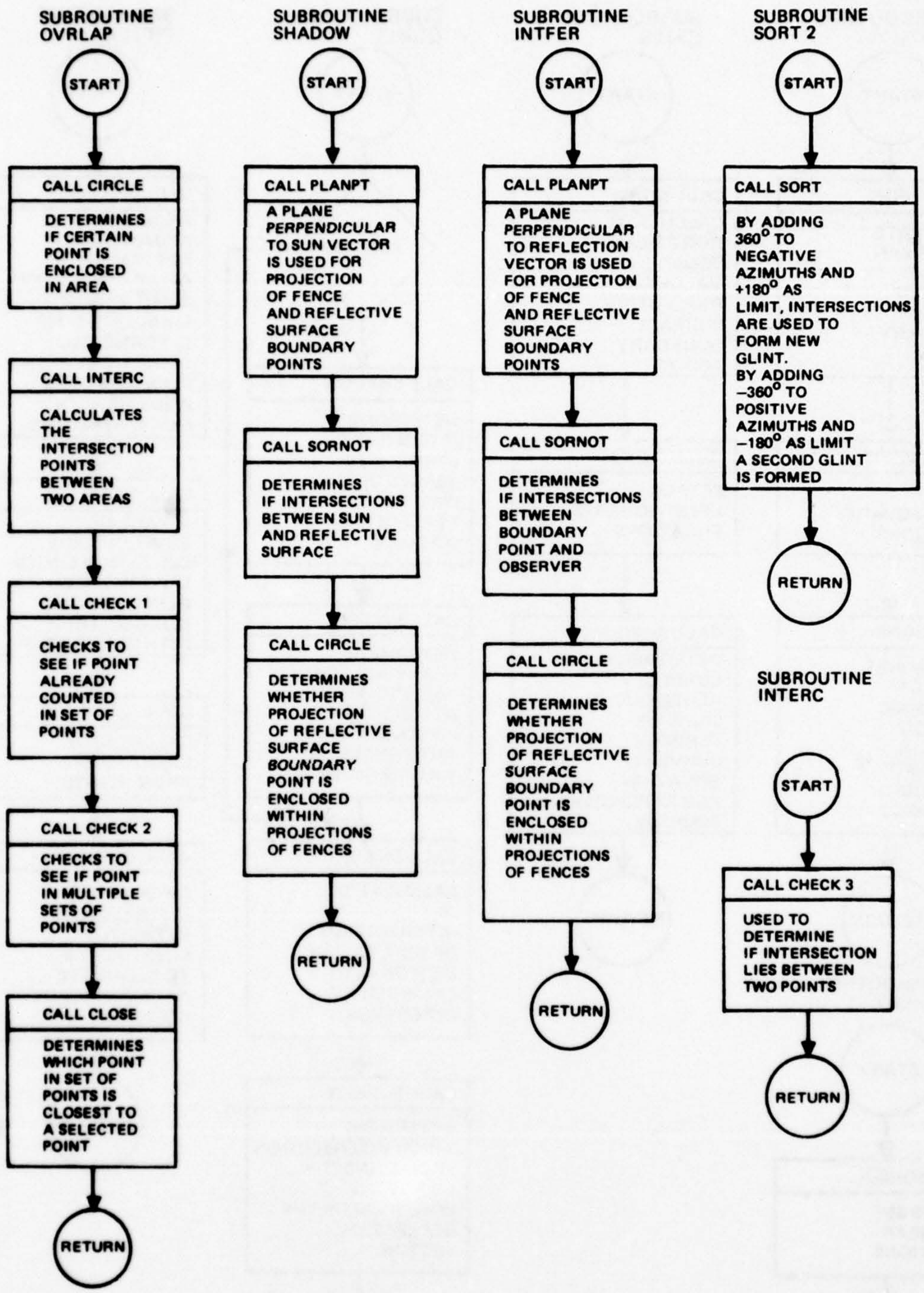


Figure 9. Flow Charts for Subroutines (Sheet 2 of 3).

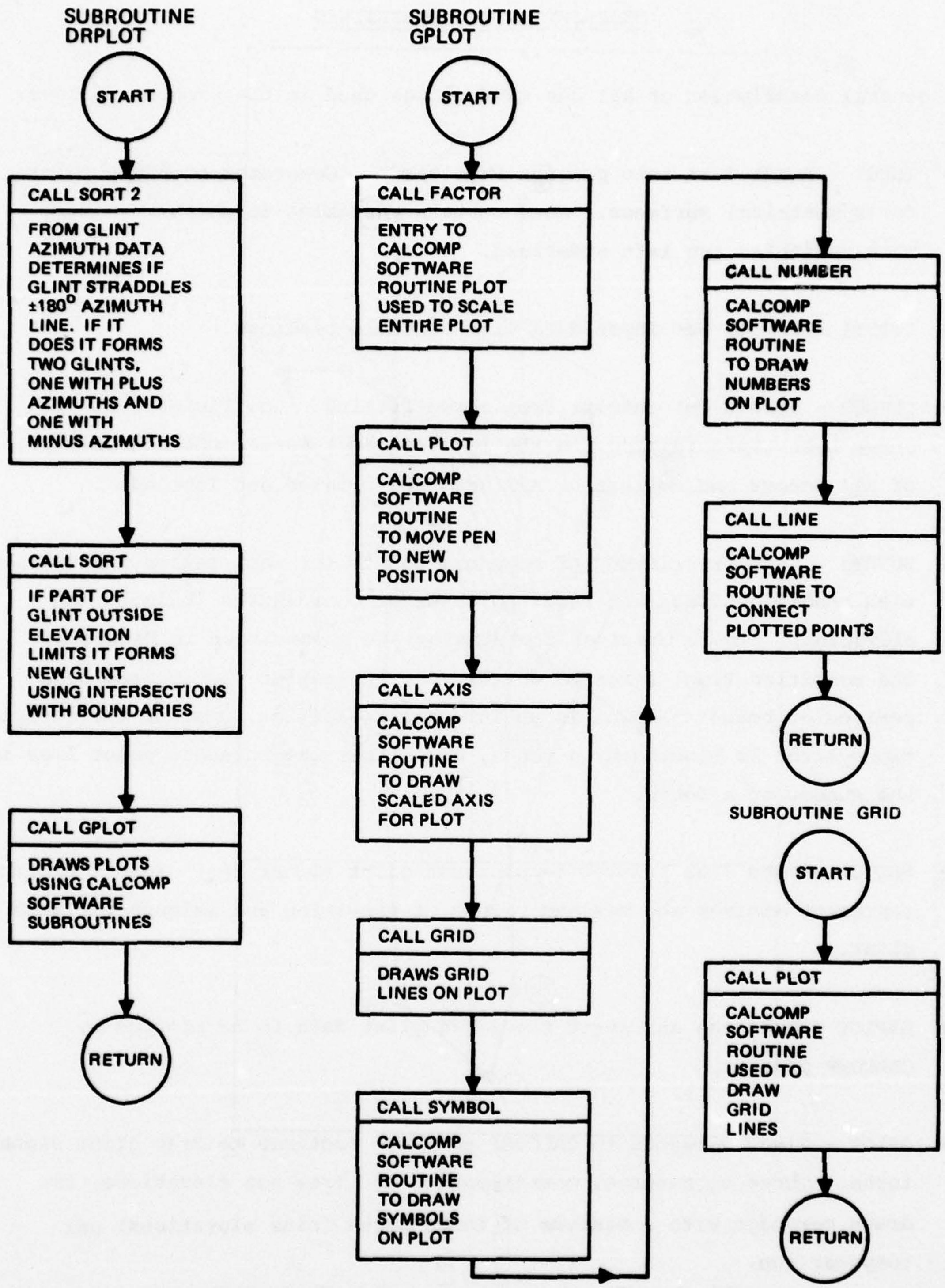


Figure 9. Flow Charts for Subroutines (Sheet 3 of 3).

DESCRIPTION OF SUBROUTINES

A general description of all the subroutines used in the program follows:

- INPUT - Reads data into program from cards. Generates boundary points for symmetrical surfaces. Sets certain variables to default values, when variables are left undefined.

- OUTPT1 - Prints out input data with suitable headings.

- OUTPT2 - Prints out results from curve-fitting. Coefficients of the curve best approximating, in the least-squares sense, the boundary points of all fences and reflective surfaces are printed and labeled.

- OUTPT3 - Tabular printout of boundary points for each reflective surface with condition flags and required observer coordinates (azimuth and elevation). These observer coordinates are those shown in Figure 5. The condition flags refer to whether the reflection vector from each particular boundary point is an internal reflection, whether the reflection vector is blocked by a fence, or whether the boundary point lies in the shadow of a fence.

- PLOTOL - Uses line printer to plot sun glint signatures. Points plotted represent minimum and maximum values of elevation and azimuth for each glint.

- DRPLOT - Prepares and sorts tabulated glint data to be plotted by CALCOMP plotter.

- GPLOT - Gives commands to CALCOMP software routines to draw glint signatures. Three signatures, corresponding to three sun elevations, are drawn per page with a maximum of three pages (nine elevations) per computer run.

- PLOTS, FACTOR, PLOT, AXIS, SYMBOL, NUMBER, and LINE - CALCOMP software functions which are supplied by CALCOMP BASIC SOFTWARE package.

- GRID - Normally a CALCOMP software routine; this subroutine was written and included as part of the program since it is not part of the basic packages supplied to some CALCOMP users. If system already has GRID, modify subroutine name and call statement to make it unique, i.e., GRIB instead of GRID.

- CFITF - Along with the subroutines NORM, CURFIT, SIGNF, and EQNSOL, curve-fits the boundary points of a fence to a plane (linear) surface in space.

- NORM - In an attempt to minimize numerical errors during curve-fitting, boundary points are normalized. This routine calculates a norm which is the root-mean-square value of the set of coordinates representing the boundary points.

- CURFIT - Sets up the normal coefficient matrix and constant terms for the least-squares solution. Calculates the root-mean-square error of the fit by plugging boundary points into the equation of the fitted surface.

- EQNSOL - Solves a system of linear, homogeneous or inhomogeneous, equations using the technique of Gaussian elimination. It is used to solve for coefficients of the fitted surface.

- SIGNF - A surface which is represented by an equation in terms of its coordinates can also be represented by the negative of the equation. In other words,

  $$Ax + By + Cz + D = 0 = -Ax - By - Cz - D.$$

  In one case, the program will generate an outward normal to the canopy while in the other case it will generate an inward normal. In subsequent calculations, the program requires that the normal be outward. Therefore,

SIGNF is used to determine correct sign on coefficients. It does this using tests on the two possible normal vectors.

- CFITS - A set of boundary points representing a reflective surface is used to produce, in general, a quadratic equation (a plane surface is considered a degenerate quadratic surface). This equation is an analytical representation of the points in a least-squares error sense. There are three options available when trying to match an equation to a set of points. The first is to specify the coefficients, either all or some. In this case the calculated values are overridden by the input values. The second option is to specify which coefficients are to be included in the matching equation. For instance, if the program user wished the surface through the boundary points to be quadratic in x while linear in z, he would specify through his inputs that the other terms in the general quadratic equation be ignored. The third option, which is probably the most useful, starts out by trying to match the points to a linear equation (plane surface). If this equation fails to satisfy the error criteria, the program continues to form quadratic combinations. The combination with the minimum least-squares error is selected.

- GLINT - Calculates the sun glints for each reflective surface as aircraft varies heading. First the components of the sun vector are transformed from the inertial axes to the body axes by the transformation in Figure 4. Then each boundary point of the reflective surfaces is checked to see if it lies in the shadow of a fence. Next the normal to the reflective surface at each boundary point is calculated followed by the calculation of the reflection vectors. Each reflection vector is checked to see if it intersects any fences. Then the components of the reflection vectors are transformed from the body axes to the inertial axes. Finally, these reflection vectors are extended as in Figure 5 to find the coordinates of each sun glint.

- SHADOW - Answers the question, "Is a boundary point of a reflective surface in the shadow of a fence?" To answer this question, first it is determined whether any of the planes containing the fences are

located between the boundary point and the sun. If a fence plane lies between the sun and the reflective surface boundary point, the intersection of the line formed by projecting the boundary point along the sun vector with the plane of the fence is saved. Finally, it is determined whether any of the saved intersections lie within the boundaries of their respective fences. If any of them do, then the reflective surface boundary point is indeed in a shadow and the ISHAD flag is set to one for this point. The coordinates of the sun glint for this point are still calculated and tabulated but not plotted and not used in the probability calculation.

- PLANPT - Given the equation of a plane surface and the representation of a line by a point and direction cosines, the intersection of the line with the plane is calculated.

- SORNOT - Given a point and the coordinates of a unit vector, a line through the point with the same direction cosines as the vector is formed. It is then determined whether a second point on the line is in the positive or negative sense of the vector (see Figure 10).

- INTFER - Answers the question, "Does a reflection vector intersect a fence before reaching a possible observer?" To answer this question, first it is determined whether any of the planes containing the fences are located between the reflective surface boundary point from which the reflection vector eminates and any possible observer. If a fence plane lies between the boundary point and the observer, the intersection of the line formed by extending the reflection vector with the plane of the fence is saved. Finally, it is determined whether any of the saved intersections lie within the boundaries of their respective fences. If any of them do, then the reflection vector does indeed strike a fence and the INTFER flag is set to one for the reflective boundary point corresponding to the reflection vector. The coordinates of the sun glint for this point are still calculated and tabulated but not plotted and not used in the probability calculation.

- QUADPT - Calculates the intersection or intersections of a line with a quadratic surface. Inputs to the subroutine are the coordinates of a point on the line, the direction cosines of the line, and the coefficients of the equation describing the quadratic surface.

- MINMAX - Determines minimum and maximum values of the elevations and azimuths for each sun glint. At this point, 0.25 degree is added to the maximums and subtracted from the minimums to represent sun dispersion angle. These values are plotted and used to determine probability.

- PROBL - As the aircraft changes heading, with fixed sun elevation and fixed aircraft pitch and roll attitudes, the sun glint from a reflective surface may change position on the sun glint signature plot, as was shown in Figure 6. If all intermediate positions between the discrete sun glint positions calculated are assumed possible, then there is a continuous area swept out during the heading changes. The total of all the areas swept by all the reflective surfaces, but counting any overlap only once, divided by the total area possible will yield the probability for this sun elevation. In programing a method to calculate the swept area, certain assumptions and simplifications were found necessary. Figure 11 shows a hypothetical example of the motion of a sun glint from one reflective surface. The four points shown for each sun glint are the results from MINMAX, which represent the minimum and maximum observer elevations and azimuths for this glint. This is simplification number one, to use only the minimum and maximums to represent each glint. This allows for the generation of the polygon shown in Figure 11 by the dotted lines. The single point C at zero aircraft heading is another simplification or assumption and is caused when all the boundary points of the reflective surface at this heading are in the shadow of one or more fences or when the generated reflection vectors are blocked by one or more fences. In other words, there is no glint for this surface at zero heading. However, at headings of ±80 degrees there are glints; therefore, the approach chosen was to place a single point at the average azimuth and elevation of the observers had the fences not been there and thus a glint created.

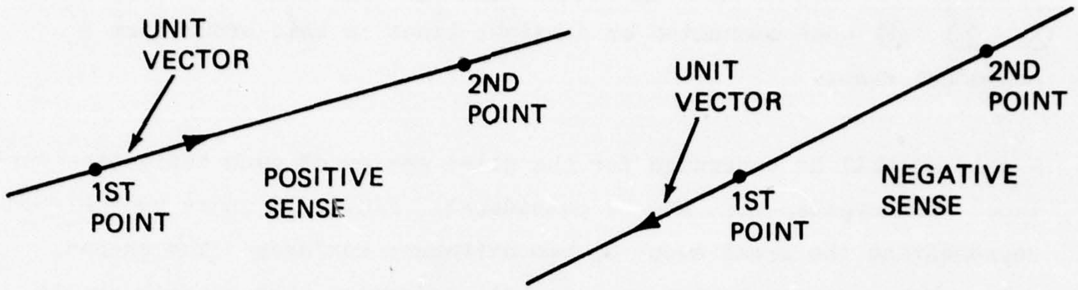


Figure 10. Determination of Positive Sense Between Two Points.

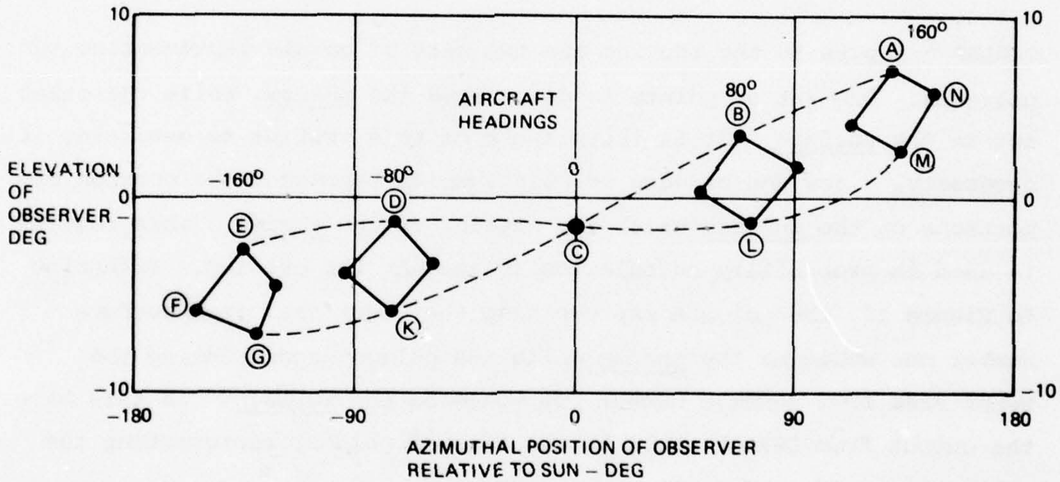


Figure 11. Area Swept by Sun Glints From Single Reflective Surface.

By doing this, the area is tapered to zero on both sides of the point C As shown, the points F E D C B A N M L C K G F when connected by straight lines in this order form a polygonal shape.

A polygon will be generated for the glint motion of each reflective surface. The overlap must now be considered. Figure 12 shows two polygons representing the areas swept by two different surfaces. The shaded area represents the common area to both polygons. The program treats polygon 1 as if polygon 2 does not exist; thus the shaded area is included in 1. Then polygon 2 is broken up into two polygons formed by the points P Q R X Y and SS S T U V W TT. When finished there are three polygons, instead of two, but with no common area.

- OVRLAP - Inputs to the routine are two sets of points representing two polygons. One set of points is designated the shadow, while the other set is the surface. It is the purpose of this routine to generate, if necessary, a new set or sets of points which represent the portion or portions of the surface which lie outside of the shadow. This routine is used in probability calculation to account for overlap. Referring to Figure 12, the polygon representing the swept area from surface number one would be the shadow while the polygon representing the swept area from surface number two would be the surface. In this case, the output from OVRLAP would be two sets of points, representing the two portions of surface lying outside of shadow.

- INTERC - Finds intersections, if any, of a line between two points in a plane with the set of lines given by a set of connected points in the same plane.

- CLOSE - Determines which point in a set of points in a plane is closest to a given point in the same plane.

- CHECK 1 - Determines whether a given point is already contained in a set of points.

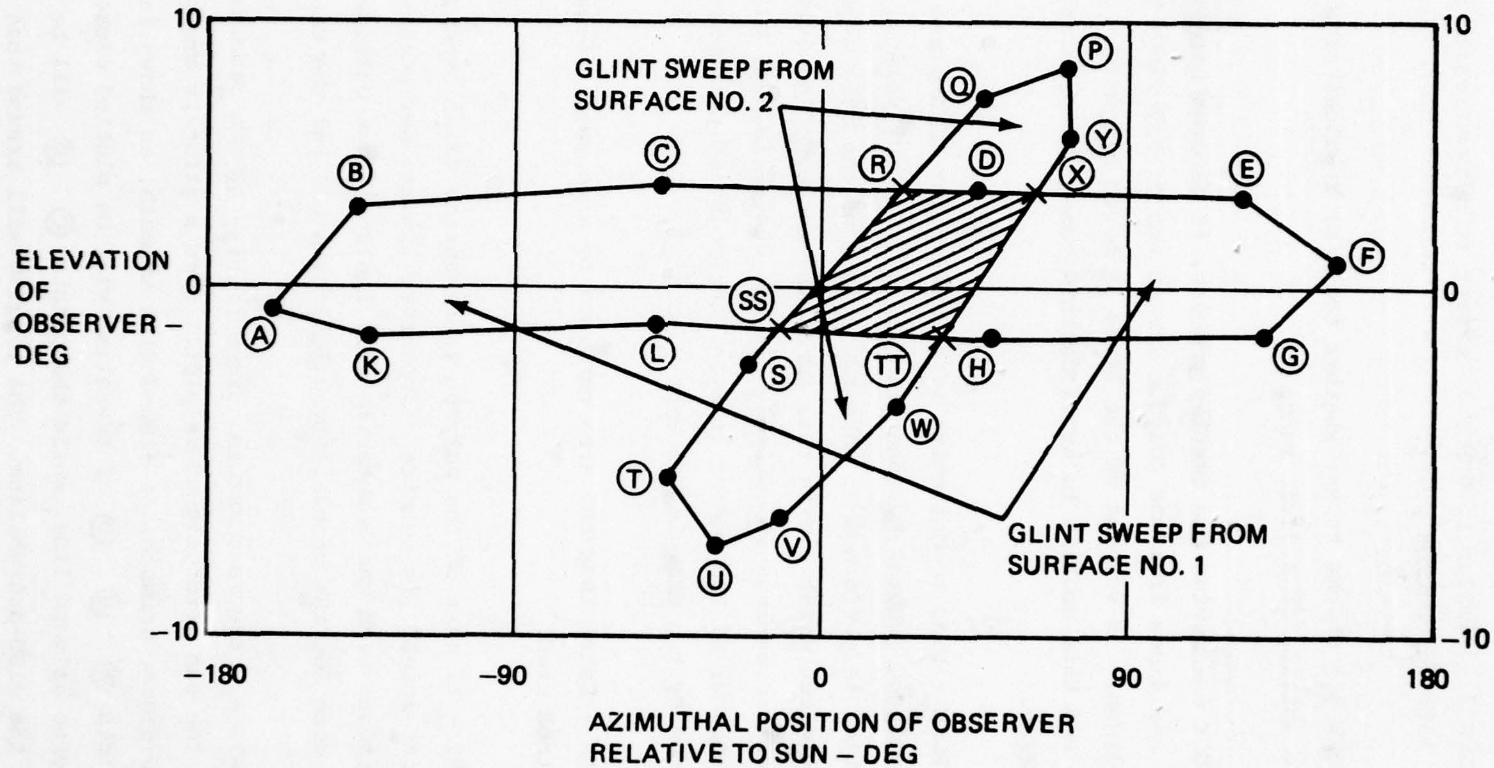


Figure 12. Overlap of Areas Swept by Glints From Two Reflective Surfaces.

- CHECK 2 - Similar to CHECK 1, except it automatically checks a number of sets for common point.

- CHECK 3 - Checks to see whether the X or Y values of a point in a plane are outside of a given range.

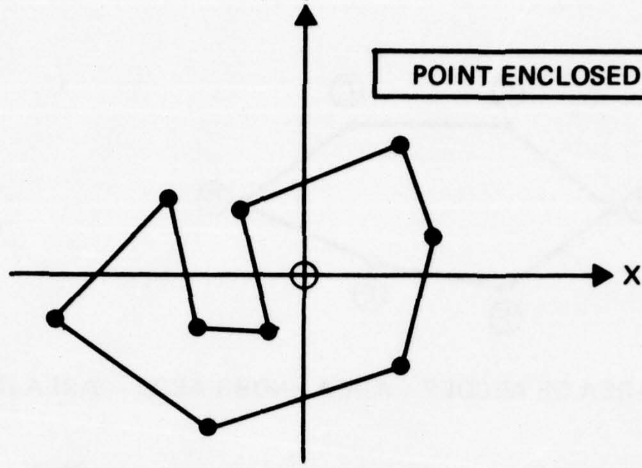
- CHECK 4 - During the overlap process, it becomes necessary to check to see if any lines from one polygon lie on top of any lines from the other polygon. If so, one of the lines is moved slightly. It became necessary to add this routine to avoid certain numerical problems in the subroutine OVRLAP.

- CIRCLE - Used to determine if a given point in a plane is enclosed by a polygon created by connecting a given set of points. First, a translation is performed to make the origin of the axis sytem lie on top of the given point. With this done, the number of positive or negative X-axis crossings is counted. If the number is odd, the point is enclosed; if the number is even, the point is not enclosed. This is shown by two examples in Figure 13.

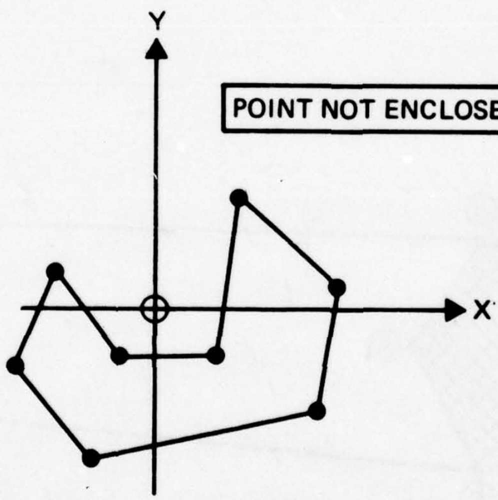
- AREA - Determines the area enclosed by a polygon. Figure 14 shows the method used.

- SORT - If part of the polygon representing glint sweep, or part of the glint itself, is outside of observer limits, new points at the intersections with the boundaries will replace those outside limits. This is done for the probability calculation and for the CALCOMP plots.

- SORT2 - There is a natural discontinuity at the ±180-degree azimuths on the sun glint signature plot. When a glint is wrapped around the 180-degree azimuth, or -180-degree azimuth, as shown in Figure 15, the points A B E of the glint will be plotted close to the -180-degree azimuth line, while the points C D will be plotted close to the +180-degree line. The program will assume that the glint A



NUMBER OF POSITIVE X CROSSINGS IS 1 (ODD)
NUMBER OF NEGATIVE X CROSSINGS IS 3 (ODD)



NUMBER OF POSITIVE X CROSSINGS 2 (EVEN)
NUMBER OF NEGATIVE X CROSSINGS 2 (EVEN)

Figure 13. Determination of Point Enclosure.

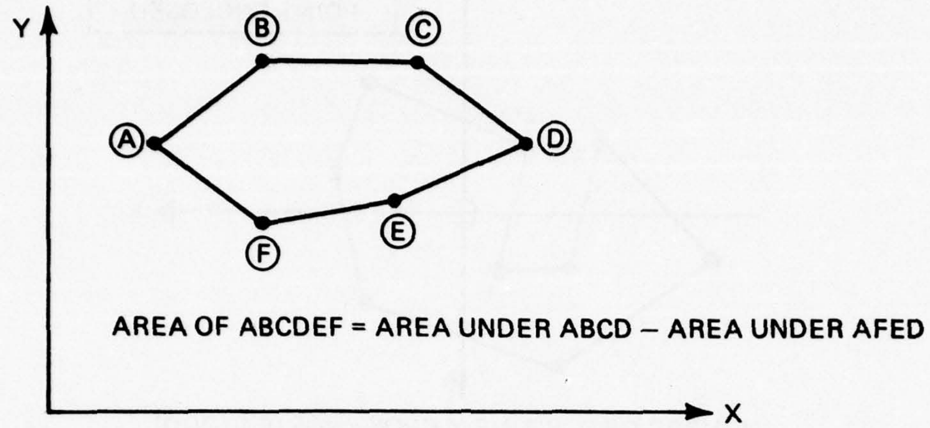


Figure 14. Area Enclosed by Polygon.

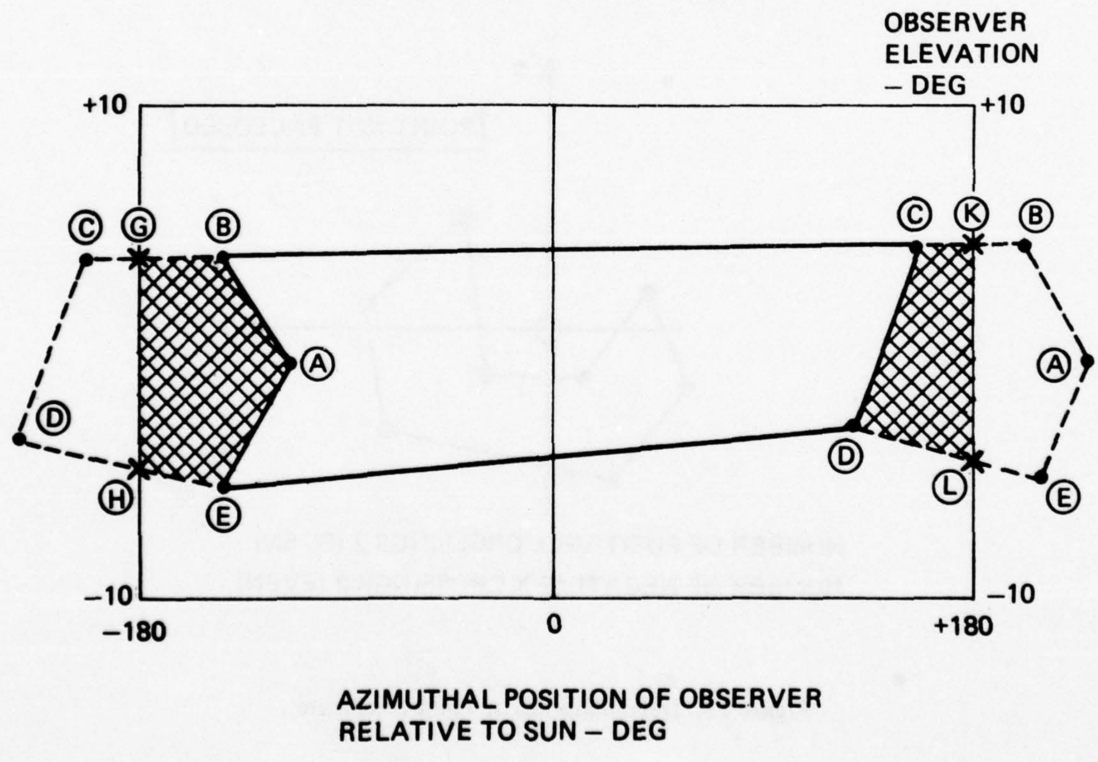


Figure 15. Discontinuity at ±180 Degrees Azimuth.

B C D E is connected as shown with the solid lines. To handle this situation properly, the glint A B C D E is replaced with two glints, A B G H E and C K L D . The new glints are shown shaded in Figure 15. The method employed is to first add 360 degrees to points A B E , moving them to the right as shown. Subroutine SORT is then used to find points K L . Next, 360 degrees are subtracted from points C D , moving them to the left as shown. Subroutine SORT is then used to find points G H .

EQUATIONS USED IN THE PROGRAM

The mathematical expressions used in calculating the sun glint coordinates are presented in this section.

The general form of the equation used to represent all fences is a plane,

$$Ax + By + Cz + D = 0.$$

The general form of the equation used to represent all reflective surfaces is a quadratic surface,

$$Ax^2 + By^2 + Cz^2 + Dxy + Exz + Fyz + Gx + Hy + Kz + L = 0.$$

The sun vector referred to inertial coordinates is of the form

$$\bar{S} = a\bar{i} + b\bar{j} + c\bar{k} ,$$

where $(\bar{i}, \bar{j}, \bar{k})$ are unit vectors in the direction of the inertial x, y, z axes, respectively. The coefficients a, b, and c are defined using γ, the sun elevation, as

$$a = -\cos \gamma$$
$$b = 0$$
$$c = -\sin \gamma .$$

The normal to the reflective surface in body axes is

$$\bar{N}_B = N_{B_x} \bar{i}_B + N_{B_y} \bar{j}_B + N_{B_z} \bar{k}_B = \frac{\partial \phi}{\partial x} \bar{i}_B + \frac{\partial \phi}{\partial y} \bar{j}_B + \frac{\partial \phi}{\partial z} \bar{k}_B ,$$

where $(\bar{i}_B, \bar{j}_B, \bar{k}_B)$ are unit vectors in the direction of aircraft body x, y, z axes, respectively, and the coefficients $\frac{\partial \phi}{\partial x}$, $\frac{\partial \phi}{\partial y}$, and $\frac{\partial \phi}{\partial z}$ are the first partial derivatives of the equation representing the surface.

$$\frac{\partial\phi}{\partial x} = 2Ax + Dy + Ez + G$$

$$\frac{\partial\phi}{\partial y} = 2By + Dx + Fz + H$$

$$\frac{\partial\phi}{\partial z} = 2Cz + Ex + Fy + K.$$

Before the reflection vector can be calculated, the sun vector must be represented in terms of body axes.

$$(S_{x_B}, S_{y_B}, S_{z_B})^T = D\,(-\cos\gamma,\ 0,\ -\sin\gamma)^T$$

where $(S_{x_B}, S_{y_B}, S_{z_B})$ are the components of the sun vector in body axes and D is the transformation matrix shown in Figure 4.

The magnitude of the sun vector along the normal to the surface is the projection of the sun vector onto the normal vector. Mathematically, it is the dot product of the sun vector and the normal vector, divided by the magnitude of the normal vector.

$$S_N = \bar{S}_B \cdot \bar{N}_B / |\bar{N}_B|,$$

where $\bar{S}_B = S_{x_B}\bar{i}_B + S_{y_B}\bar{j}_B + S_{z_B}\bar{k}_B$ and

$$|\bar{N}_B| = \sqrt{N_{B_x}^2 + N_{B_y}^2 + N_{B_z}^2}\ .$$

Using the value of S_N, the reflection vector $\bar{R}_B$ is

$$\bar{R}_B = R_{x_B}\bar{i}_B + R_{y_B}\bar{j}_B + R_{z_B}\bar{k}_B = \bar{S}_B - (2\,S_N)\,\bar{N}_B/|\bar{N}_B|.$$

Transforming the components of the reflection vector from body to inertial axes is done by

$$(R_{x_I}, R_{y_I}, R_{z_I})^T = D^T\,(R_{x_B}, R_{y_B}, R_{z_B})^T,$$

where D^T is transpose of the matrix of Figure 4.

Each boundary point of the reflective surface is transformed from body coordinates to inertial coordinates.

$$(x_{S_I}, y_{S_I}, z_{S_I})^T = D^T (x_{S_B}, y_{S_B}, z_{S_B})^T$$

The intersections caused by the line passing through the point $(x_{S_I}, y_{S_I}, z_{S_I})$ with direction numbers $(R_{x_I}, R_{y_I}, R_{z_I})$ and the cylinder

$$x^2 + y^2 = R^2,$$

which is the imaginary surface containing the possible observers, are $(x_{0_1}, y_{0_1}, z_{0_1})$ and $(x_{0_2}, y_{0_2}, z_{0_2})$.

$$x_{0_1} = (-b + \sqrt{b^2-4ac})/2a$$

$$x_{0_2} = (-b - \sqrt{b^2-4ac})/2a$$

$$y_{0_1} = y_{S_I} + (R_{y_I}/R_{x_I})(x_{0_1} - x_{S_I})$$

$$y_{0_2} = y_{S_I} + (R_{y_I}/R_{x_I})(x_{0_1} - x_{S_I})$$

$$z_{0_1} = Z_{S_I} + (R_{z_I}/R_{x_I})(x_{0_1} - x_{S_I})$$

$$z_{0_2} = z_{S_I} + (R_{z_I}/R_{x_I})(x_{0_1} - x_{S_I}),$$

where $a = 1 + (R_{y_I}/R_{x_I})^2$

$$b = 2y_{S_I}(R_{y_I}/R_{x_I}) - 2x_{S_I}(R_{y_I}/R_{x_I})^2$$

The equations are modified slightly if $R_{x_I} = 0$.

The point which lies in the positive direction of the reflection vector is designated (x_o, y_o, z_o), and the polar coordinates of this point are

$$\alpha = \tan^{-1} (z_o / \sqrt{x_o^2 + y_o^2})$$

$$\beta = \tan^{-1} (y_o/x_o) ,$$

where α is the elevation angle and β is the azimuth angle as shown in Figure 5.

INPUT VARIABLES

The input variables to the computer program are presented in this section.

- TITLE - Title printed at top of each output page.

- DEFLT - Specifies whether default option is to be used during inputting of reflective surface data. The default option reduces the amount of necessary input.

  DEFLT = 0 Default option not used

  DEFLT = 1 Default option used

- PRINT - Controls how much and what type of data will be printed. Any plots, whether printer plots or CALCOMP plots, will be controlled by another input. Figure 16 shows the results of each option.

- PLOT - Plot options. When plots are requested, a sun glint signature plot for each sun elevation is produced either on CALCOMP plotter or on printer, or both.

  PLOT = 0 No plots

  PLOT = 1 CALCOMP plots only

  PLOT = 2 Print plots only

  PLOT = 3 Both CALCOMP and print plots

- PROBL - Specifies whether to calculate probability.

  PROBL = 0 Probability calculation bypassed

  PROBL = 1 Calculate probability

- THETA - Aircraft pitch attitude in degrees. Positive for nose of aircraft up. Used in forming the inertial-to-body axis transformation shown in Figure 4.

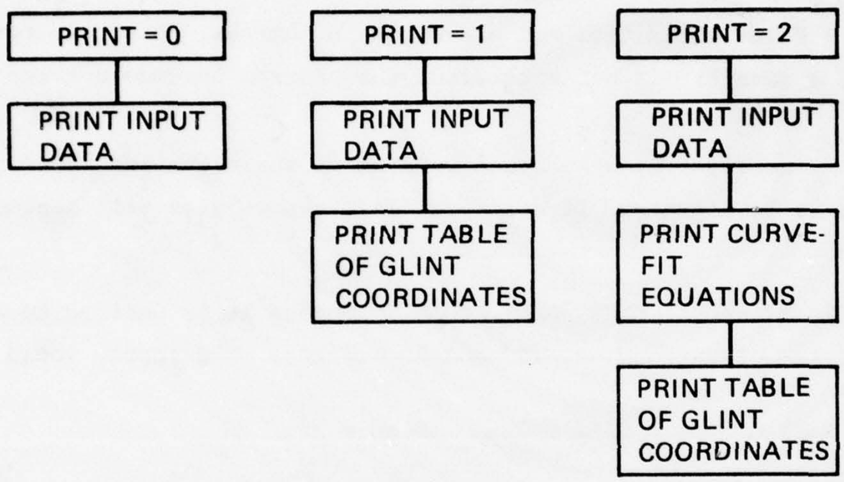


Figure 16. Computer Output From Option PRINT.

- <u>PHI</u> - Aircraft roll attitude in degrees. Positive for right wing down. Used in forming the inertial-to-body axis transformation shown in Figure 4.

- <u>GAMN</u> - Number of different sun elevations to be analyzed. Value should be less than or equal to 9. If not specified, the program assumes a value of 3.

- <u>GAMI</u> - Value of initial sun elevation in degrees. Positive for sun above aircraft. If not specified, the program assumes a value of zero.

- <u>DGAM</u> - Increment by which each successive sun elevation is increased. Value is in degrees. If not specified, the program will assume a value of 30.

  Example of use of GAMN, GAMI, DGAM: Suppose it is desired to analyze three sun elevations, 0, 15, and 30 degrees. The inputs would be

  GAMN = 3.   GAMI = 0.   DGAM = 15.

- <u>PSIN</u> - Number of different aircraft headings to be analyzed. Value should be less than or equal to 9. If not specified, a value of 9 is assumed by the program.

- <u>PSII</u> - Value of initial aircraft heading (yaw) in degrees. Heading is positive for nose right as shown in Figure 1. A value of -180 degrees is assumed by the program when no value is specified.

- <u>DPSI</u> - Increment by which each successive heading is increased. Value is in degrees. If no value is specified, a value of 45 degrees is used.

- <u>XROT</u> - Station that locates the center of rotation of the aircraft (see Figure 4). Usually the aircraft center of gravity. If not specified, a value of zero is used.

- <u>YROT</u> - Buttline location of the center of rotation. If not specified, a value of zero is used.

- ZROT - Waterline location of the center of rotation. If not specified, a value of zero is used.

- DISTG - Radial distance (feet) in inertial x-y plane from origin of inertial axes to projected glint. This distance is specified as R in Figure 5. If not specified, a value of 1,000 feet is used by the program.

- ELVMIN - Lower limit on elevation angle of possible observers. Value is in degrees. If not specified, a value of -10 degrees is used. ELVMIN is used in probability calculation and lower boundary on sun glint signature plots. Value cannot be less than -90 degrees.

- ELVMAX - Upper limit on elevation angle of possible observers. Value is in degrees. If not specified, a value of 10 degrees is used. ELVMAX is used in probability calculation and upper boundary on sun glint signature plot. Value cannot be greater than 90 degrees.

- AZMMIN - Minimum allowable azimuth angle to observer, in degrees. If not specified, a value of -180 degrees is used. AZMMIN is the boundary on the left of the sun glint signature plot. Value cannot be less than -180 degrees.

- AZMMAX - Maximum allowable azimuth angle to observer, in degrees. If not specified, a value of 180 degrees is used. AZMMAX is the boundary on the right of the sun glint signature plot. Value cannot be greater than 180 degrees.

- FENCES - Number of fences. Maximum number is 10.

- PANELS - Number of reflective (transparency) panels. Maximum number is 12.

- FPTS - Number of boundary points on a fence. Maximum value is 10.

- XFPT - Station for a fence boundary point.

- YFPT - Buttline for a fence boundary point.

- ZFPT - Waterline for a fence boundary point.

- TITLES - Transparency (reflective) surface identification.

- SYMTRY - Specifies whether the transparency surface just identified is symmetric to the surface, whose data has just been read in. This option will be made clearer with the sample cases in Appendix A. The possible values for SYMTRY are:

  SYMTRY = 0. Not symmetric to previous surface and therefore data for this surface is necessary.
  SYMTRY = 1. Symmetry is about x-z plane.
  SYMTRY = 2. Symmetry is about x-y plane.
  SYMTRY = 3. Symmetry is about y-z plane.

  If SYMTRY ≠0, then the following variables are not necessary for this reflective surface.

  The variables XFIT, YFIT, ZFIT, XYFIT, XZFIT, YZFIT, XSQFIT, YSQFIT, ZSQFIT, XCOF, YCOF, ZCOF, XYCOF, XZCOF, YZCOF, XSQCOF, YSQCOF, ZSQCOF, and CTERM are used only if DEFLT = 0. With these variables, the program user may either specify which terms in the general quadratic equation he wishes to use in the curve-fit routine, or he may specify the actual values for these coefficients.

- XFIT - Should the linear x term in the quadratic equation be used in the curve-fit analysis of this surface?

  XFIT = 0. No
  XFIT = 1. Yes

- YFIT - Should the linear y term in the quadratic equation be used in the curve-fit analysis of this surface?

YFIT = 0. No

YFIT = 1. Yes

- ZFIT - Should the linear z term in the quadratic equation be used in the curve-fit analysis of this surface?

  ZFIT = 0. No

  ZFIT = 1. Yes

- XYFIT - Should the quadratic xy term in the quadratic equation be used in the curve-fit analysis of this surface?

  XYFIT = 0. No

  XYFIT = 1. Yes

- XZFIT - Should the quadratic xz term in the quadratic equation be used in the curve-fit analysis of this surface?

  XZFIT = 0. No

  XZFIT = 1. Yes

- YZFIT - Should the quadratic yz term in the quadratic equation be used in the curve-fit analysis of this surface?

  YZFIT = 0. No

  YZFIT = 1. Yes

- XSQFIT - Should the quadratic x^2 term in the quadratic equation be used in the curve-fit analysis of this surface?

  XSQFIT = 0. No

  XSQFIT = 1. Yes

- YSQFIT - Should the quadratic y^2 term in the quadratic equation be used in the curve-fit analysis?

YSQFIT = 0. No

YSQFIT = 1. Yes

- ZSQFIT - Should the quadratic z^2 term in the quadratic equation be used in the curve-fit analysis?

  ZSQFIT = 0. No

  ZSQFIT = 1. Yes

- XCOF - If a nonzero value is read in for XCOF, then the value for XCOF will be used for the coefficient of x in the quadratic equation representing this reflective surface. XFIT must be set to one when XCOF is used.

- YCOF - If a nonzero value is read in for YCOF, then the value for YCOF will be used for the coefficient of y in the quadratic equation representing this reflective surface. YFIT must be set to one when YCOF is used.

- ZCOF - If a nonzero value is read in for ZCOF, then the value for ZCOF will be used for the coefficient of z in the quadratic equation representing this reflective surface. ZFIT must be set to one when ZCOF is used.

- XYCOF - If a nonzero value is read in for XYCOF, then the value for XYCOF will be used for the coefficient of xy in the quadratic equation representing this reflective surface. XYFIT must be set to one when XYCOF is used.

- XZCOF - If a nonzero value is read in for XZCOF, then the value for XZCOF will be used for the coefficient of xz in the quadratic equation representing this reflective surface. XZFIT must be set to one when XZCOF is used.

- XSQCOF - If a nonzero value is read in for XSQCOF, the value for XSQCOF will be used for the coefficient of x^2 in the quadratic equation representing this reflective surface. XSQFIT must be set to one when XSQCOF is used.

- YSQCOF - If a nonzero value is read in for YSQCOF, the value for YSQCOF will be used for the coefficient of y^2 in the quadratic equation representing this reflective surface. YSQFIT must be set to one when YSQCOF is used.

- ZSQCOF - If a nonzero value is read in for ZSQCOF, the value for ZSQCOF will be used for the coefficient of z^2 in the quadratic equation representing the reflective surface. ZSQFIT must be set to one when ZSQCOF is used.

- CTERM - If a nonzero value is read in for CTERM, the value for CTERM will be used for the constant term in the quadratic equation for this reflective surface.

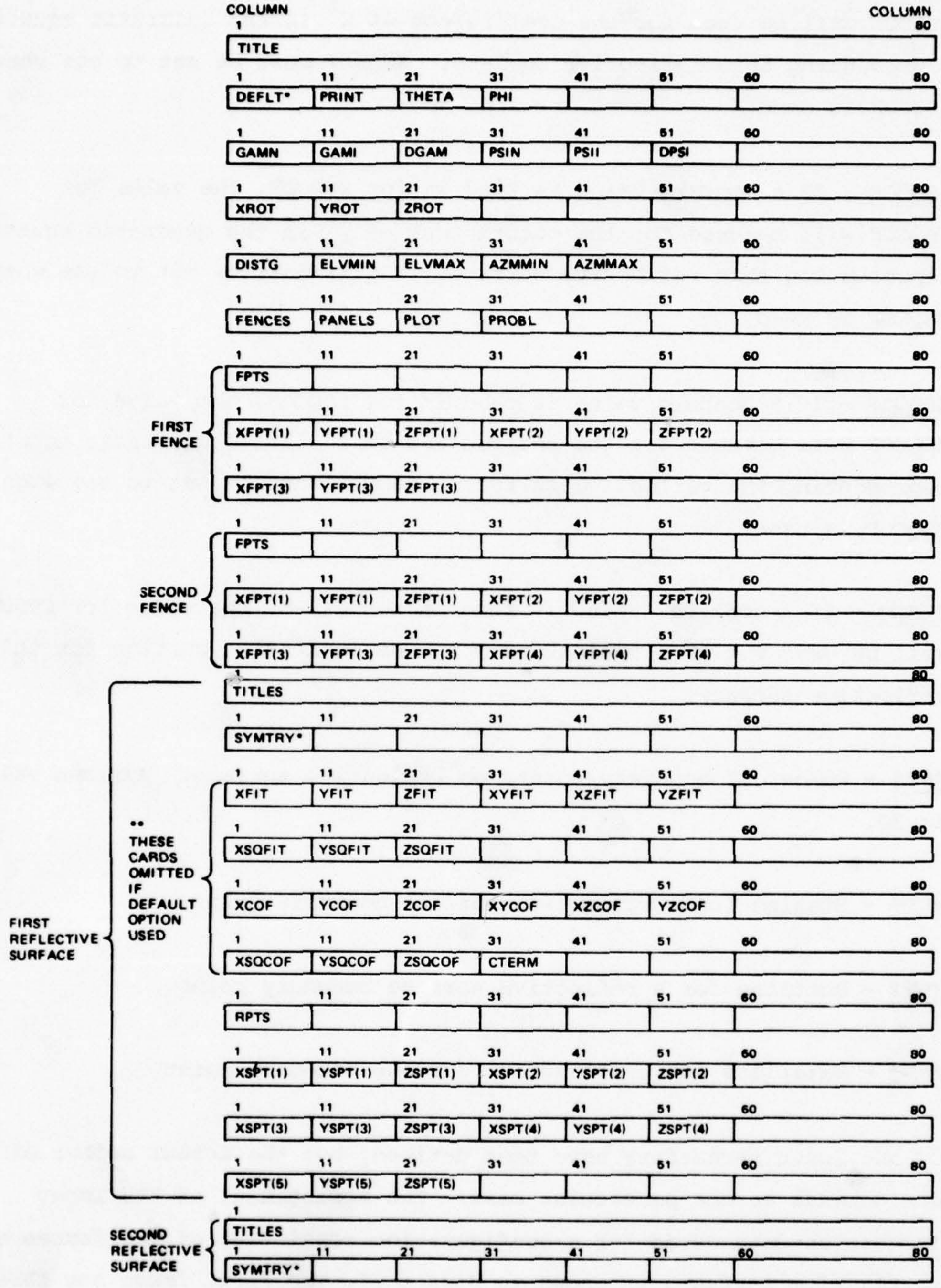
- RPTS - Number of boundary points on reflective surface. Maximum value is 30.

- XSPT - Station for a reflective surface boundary point.

- YSPT - Buttline for a reflective surface boundary point.

- ZSPT - Waterline for a reflective surface boundary point.

Fifty-one input parameters have been defined, but the actual number of inputs depends on the particular case. The arrangement of the input parameters on data cards for a configuration consisting of two fences and two reflective surfaces is shown in Figure 17. The first fence has three boundary points and the second fence has four. The two reflective surfaces are symmetric about the x-z plane and are defined by four boundary



* FOR THIS SETUP
DEFLT = 0.
SYMTRY = 0. (FIRST REFLECTIVE SURFACE)
SYMTRY = 1. (SECOND REFLECTIVE SURFACE)
** DEFLT = 1.

Figure 17. Input Data Scheme.

points. The default option will not be used in readinq in the reflective surface data; however, the comments show which cards are omitted if the default option is used.

GENERATED SYMBOLS

The symbolic names for the variables of interest which are assigned values during the execution of the program are presented in this section.

- COEFFB - Array containing the coefficients of the equations representing the fences.

- COEFSB - Array containing the coefficients of the equations representing the reflective surfaces.

- SIGF - Array containing the root-mean-square estimate of the error for each fence curve-fit.

- SIGS - Array containing the root-mean-square estimate of the error for each reflective surface curve-fit.

- GAMMA - Sun elevation angle. Takes on values specified by the inputs GAMN, GAMI, and DGAM.

- ALPHA2 - Array containing the elevation angles for all the sun glints generated.

- BETA2 - Array containing the azimuth angles for all the sun glints generated.

- INTRFL - Array containing a set of condition flags. Each flag records whether a particular set of sun glint coordinates was generated by an internal reflection.

  INTRFL = 0 External reflection

  INTRFL = 1 Internal reflection

- ISHADW - Array containing a set of condition flags. Each flag records whether a particular set of sun glint coordinates was generated from a boundary point in the shadow of a fence.

  ISHADW = 0 Boundary point not in shadow

  ISHADW = 1 Boundary point in shadow

- INTERF - Array containing a set of condition flags. Each flag records whether a particular set of sun glint coordinates was generated by a reflection vector which intersected a fence.

  INTERF = 0 No intersection with fence

  INTERF = 1 Reflection vector blocked by a fence

- APLOT - Array containing the minimum and maximum elevation angles which were formed at each aircraft heading.

- BPLOT - Array containing the minimum and maximum azimuth angles which were formed at each aircraft heading.

- SUN - Three-dimensional array containing the coordinates of the unit sun vector in inertial axes.

- SUNB - Three-dimensional array containing the coordinates of the unit sun vector in aircraft body axes.

- DIRCOS - Three-by-three matrix containing the orthonormal transformation shown in Figure 4 used to transform coordinates of a vector from inertial to body axes.

- XB - Coordinates of a reflective surface boundary point in body axes. Array is redefined for each boundary point being analyzed.

- X - Coordinates of a reflective surface boundary point in inertial axes.

- VNORMB - Coordinates of normal to reflective surface.

- RFLTN - Coordinates of reflection vector referred to inertial axes.

- XPLOT - Array of azimuthal values of points forming the polygon representing the area swept by glints from a reflective surface.

- YPLOT - Array of elevation angles for points forming the polygon representing the area swept by glints from a reflective surface.

- SWEEP - Area swept by the sun glints from all the reflective surfaces, ignoring overlap.

- SWA2 - Area swept by the sun glints from all the reflective surfaces, counting the overlap area only once.

- TAREA - Total possible area of sun glint signature plot.

- VPROBL - Value of probability calculation. SWA2 divided by TAREA.

OUTPUT

The output from the program is broken up into five sections and controlled by the input variables PRINT and PLOT as defined previously. The five types of output are:

- Input data
- Curve-fit results
- Tabular sun glint results
- Sun glint signature plots using printer
- Sun glint signature plots using CALCOMP plotter.

The printout of the input data is just a feedout of the data read in from cards. Sheet 1 of Figure 18 shows the first page of this type output. The first group of input data is printed out under the caption **CONTROL OPTIONS. The input parameters presented are DEFLT, PRINT, PLOT, and PROBL, respectively. The second group of input data comes under the caption **AIRCRAFT INITIAL EULER ORIENTATION. The input parameters printed are THETA, PHI, AND PSII. Under the third and fourth captions, **SELECTED YAW ANGLE ROTATIONS and **SELECTED SUN ELEVATIONS, are printed the values for the variables PSIN, PSII, DPSI, and GAMN, GAMI, DGAM, respectively. The fifth set of information, **REFERENCE INFORMATION FOR MEASURING SUN GLINT ANGLES, in the printout of XROT, YROT, ZROT, and DISTG. The sixth and seventh sets of information, **PLOT SCALING, and **BOUNDARIES FOR CALCULATING PROBABILITY, are printouts of the same variables, AZMMIN, AZMMAX, ELVMIN, and ELVMAX. They are printed out twice, under different titles, to show that the same values are used in both places. Sheet 2 of Figure 18 is a printout of the fence input data. The number of fences (FENCES), the number of boundary points (FPTS), and the location of each boundary point (XFPT, YFPT, ZFPT) are printed out. Sheet 3 of Figure 18 shows how the input data for a reflection surface is output. Under **REFLECTIVE SURFACES DATA, the number of reflective panels (PANELS) is printed. Then, for each reflective surface, an identification title (TITLES), preselected curve-fit terms (XFIT, YFIT, ZFIT, XYFIT, XZFIT, YZFIT, XSQFIT, YSQFIT, ZSQFIT),

```
                              *** INPUT DATA ***

**CONTROL OPTIONS
   DEFAULT OPTION        0.        PRINT OPTION          2.
   PLOT OPTION           3.        PROBABILITY OPT       1.

**AIRCRAFT INITIAL EULER ORIENTATION
   PITCH              -9.0         ROLL                 0.0      YAW                  0.0

**SELECTED YAW ANGLE ROTATIONS
   NO. OF ANGLES         9.        INITIAL ANGLE        0.0      ANGLE INCREMENT     20.0

**SELECTED SUN ELEVATIONS
   NO. OF ANGLES         3.        INITIAL ANGLE        0.0      ANGLE INCREMENT     30.0

**REFERENCE INFORMATION FOR MEASURING SUN GLINT ANGLES
   REFERENCE POINT FOR MEASURING ANGLES OF GLINT SIGNATURE     DISTANCE AT WHICH GLINT SIGNATURE FORMED (FT.)     60.000
              X           Y           Z
             0.0         0.0         0.0

**PLOT SCALING
   GLINT AZIMUTH                   GLINT ELEVATION
     MINIMUM          -180.0         MINIMUM          -10.0
     MAXIMUM           180.0         MAXIMUM           10.0

**BOUNDARIES FOR CALCULATING PROBABILITY
   GLINT AZIMUTH                   GLINT ELEVATION
     MINIMUM          -180.0         MINIMUM          -10.0
     MAXIMUM           180.0         MAXIMUM           10.0
```

Figure 18. Typical Printout of Input Data (Sheet 1 of 3).

```
                              *** INPUT DATA ***
**FENCE DATA
  NO. OF FENCES        1.

  *FENCE NO.  1
   NUMBER OF POINTS       4.

   BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
              X           Y          Z                   X           Y          Z                   X           Y          Z
     ( 1)  -158.84       0.0      -12.00       ( 2)  -132.00        0.0       22.56       ( 3)   -48.00        0.0       22.56
     ( 4)   -48.00       0.0      -12.00
```

Figure 18. Typical Printout of Input Data (Sheet 2 of 3).

```
*** INPUT DATA ***

**REFLECTIVE SURFACE DATA
  NO. OF SURFACES      4.

 *REFLECTIVE SURFACE NO.  1      IDENTIFICATION: WINDSHIEL.

   CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
       (1) X    TERM   1.     (2) Y    TERM   1.     (3) Z    TERM   1.     (4) XY   TERM   0.     (5) XZ   TERM   0.
       (6) YZ   TERM   0.     (7) XSQ TERM    0.     (8) YSQ TERM    0.     (9) ZSQ TERM    0.

     INPUT VALUES FOR COEFFICIENTS OF SURFACE
       (1) X    COEF   0.0            (2) Y    COEF   0.0            (3) Z    COEF   0.0
       (4) XY   COEF   0.0            (5) XZ   COEF   0.0            (6) YZ   COEF   0.0
       (7) XSQ COEF    0.0            (8) YSQ COEF    0.0            (9) ZSQ COEF    0.0
      (10) CONSTANT    0.0

   BOUNDARY POINTS -- BODY AXES   (STATIONLINE,BUTTLINE,WATERLINE)
            X          Y          Z                  X          Y          Z                  X          Y          Z
    ( 1)  -153.48    -18.00     -12.00       ( 2)  -153.48     18.00     -12.00       ( 3)  -132.00     18.00     16.56
    ( 4)  -132.00    -18.00      16.56

 *REFLECTIVE SURFACE NO.  2      IDENTIFICATION: TOP PANEL

   CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
       (1) X    TERM   1.     (2) Y    TERM   1.     (3) Z    TERM   1.     (4) XY   TERM   0.     (5) XZ   TERM   0.
       (6) YZ   TERM   0.     (7) XSQ TERM    0.     (8) YSQ TERM    0.     (9) ZSQ TERM    0.

     INPUT VALUES FOR COEFFICIENTS OF SURFACE
       (1) X    COEF   0.0            (2) Y    COEF   0.0            (3) Z    COEF   0.0
       (4) XY   COEF   0.0            (5) XZ   COEF   0.0            (6) YZ   COEF   0.0
       (7) XSQ COEF    0.0            (8) YSQ COEF    0.0            (9) ZSQ COEF    0.0
      (10) CONSTANT    0.0

   BOUNDARY POINTS -- BODY AXES   (STATIONLINE,BUTTLINE,WATERLINE)
            X          Y          Z                  X          Y          Z                  X          Y          Z
    ( 1)  -132.00    -18.00      16.56       ( 2)  -132.00     18.00      16.56       ( 3)   -48.00     18.00     16.56
    ( 4)   -48.00    -18.00      16.56

 *REFLECTIVE SURFACE NO.  3      IDENTIFICATION: LEFT FORWARD SIDE PANEL

   CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
       (1) X    TERM   1.     (2) Y    TERM   1.     (3) Z    TERM   1.     (4) XY   TERM   0.     (5) XZ   TERM   0.
       (6) YZ   TERM   0.     (7) XSQ TERM    0.     (8) YSQ TERM    0.     (9) ZSQ TERM    0.
```

Figure 18. Typical Printout of Input Data (Sheet 3 of 3).

preselected curve-fit coefficients (XCOF, YCOF, ZCOF, XYCOF, XZCOF, YZCOF, XSQCOF, YSQCOF, ZSQCOF, CTERM), and boundary points are printed.

The second type of output is the result of curve-fitting the boundary points of each fence and reflective surface. Sheet 1 of Figure 19 shows the coefficients of the plane best approximating the boundary points of the fence. For the case shown, the equation would be $0.01476y = 0$ or just $y = 0$, which is the equation of the x-z plane. Sheet 2 of Figure 19 shows the coefficients of several quadratic equations approximating several reflective surfaces. For the case shown, the equation for the first surface is a plane, $-0.006923x + 0.005206z - 1 = 0$.

The third type of output is the tabular sun glint results. Each table represents the results for one reflective surface at constant sun elevation as aircraft heading changes. Part of a typical table is shown in Figure 20. At the top of the page, the reflective surface is identified. Next, the sun elevation, aircraft pitch and roll attitude, location of aircraft center of rotation, and radial distance to observers are printed. Then, for each aircraft heading, each boundary point is listed along with three condition flags and the point on the sun glint resulting from the reflection from this boundary point. The condition flags INRFL, ISHAD, and INTRF specify whether the reflection from this boundary point is internal, whether the boundary point lies in a shadow, or whether the reflection vector from this boundary point intersects a fence. A value of zero means <u>no</u> while a one means <u>yes</u>.

The fourth type of output is a print plot of a sun glint signature, as shown in Figure 21. Each plot is for a constant sun elevation. The values that are plotted are the minimum and maximum azimuths and elevations for each sun glint resulting from each reflective surface at each aircraft heading analyzed. Each letter, as the legend below the plot shows, is for a constant aircraft heading and may have resulted from more than one surface. The probability as previously defined is also shown in the right-hand corner below the plot.

```
*** RESULTS OF CURVE-FIT ANALYSIS ***
**FENCE DATA
   *FENCE NO. 1
      VALUES FOR COEFFICIENTS OF SURFACE
       (1) X  COEF  0.0          (2) Y  COEF  0.1526E-01     (3) Z  COEF  0.0            (4) CONSTANT  0.0
      ROOT MEAN SQUARE ERROR OF FIT=  0.0
```

Figure 19. Typical Printout of Curve-Fit Results (Sheet 1 of 2).

```
                              *** RESULTS OF CURVE-FIT ANALYSIS ***

  **REFLECTIVE SURFACE DATA

    *REFLECTIVE SURFACE NO.  1     IDENTIFICATION: WINDSHIELD

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF   -0.6923E-02     (2) Y   COEF   0.0             (3) Z   COEF   0.5206E-02
        (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
        (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.1680E-15

    *REFLECTIVE SURFACE NO.  2     IDENTIFICATION: TOP PANEL

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF   -0.2820E-17     (2) Y   COEF   0.0             (3) Z   COEF   0.6039E-01
        (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
        (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.1178E-15

    *REFLECTIVE SURFACE NO.  3     IDENTIFICATION: LEFT FORWARD SIDE PANEL

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF   -0.2007E-15     (2) Y   COEF   -0.5556E-01     (3) Z   COEF   0.7281E-16
        (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
        (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.1721E-14

    *REFLECTIVE SURFACE NO.  4     IDENTIFICATION: LEFT AFT SIDE PANEL

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF   0.3996E-17      (2) Y   COEF   -0.5556E-01     (3) Z   COEF   -0.5639E-18
        (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
        (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.1695E-15
```

Figure 19. Typical Printout of Curve-Fit Results (Sheet 2 of 2).

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 1   IDENTIFICATION: WINDSHIELD

SUN ELEVATION 60.00
A/C PITCH ATTITUDE -4.00
A/C ROLL ATTITUDE 0.0

XREF 0.0
YREF 0.0
ZREF 0.0
DISTO 64.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT ELEVATION	AZIMUTH
0.0	-153.48	-18.00	-12.00	0	0	0	3.05	-1.34
0.0	-153.48	18.00	-12.00	0	0	0	3.05	1.34
0.0	-132.00	18.00	16.56	0	0	0	5.42	1.34
0.0	-132.00	-18.00	16.56	0	0	0	5.42	-1.34
20.00	-153.48	-18.00	-12.00	0	0	0	1.79	26.60
20.00	-153.48	18.00	-12.00	0	0	0	1.77	29.25
20.00	-132.00	18.00	16.56	0	0	0	4.10	29.50
20.00	-132.00	-18.00	16.56	0	0	0	4.13	26.85
40.00	-153.48	-18.00	-12.00	0	0	0	-1.88	53.82
40.00	-153.48	18.00	-12.00	0	0	0	-1.88	56.37
40.00	-132.00	18.00	16.56	0	0	0	0.35	56.83
40.00	-132.00	-18.00	16.56	0	0	0	0.35	54.29
60.00	-153.48	-18.00	-12.00	0	0	0	-7.63	79.70
60.00	-153.48	18.00	-12.00	0	0	0	-7.51	82.13
60.00	-132.00	18.00	16.56	0	0	0	-5.47	82.76
60.00	-132.00	-18.00	16.56	0	0	0	-5.60	80.34
80.00	-153.48	-18.00	-12.00	0	0	0	-14.98	103.81
80.00	-153.48	18.00	-12.00	0	0	0	-14.60	106.13
80.00	-132.00	18.00	16.56	0	0	0	-12.92	106.88
80.00	-132.00	-18.00	16.56	0	0	0	-13.24	104.56

Figure 20. Typical Printout of Tabular Sun Glint Results.

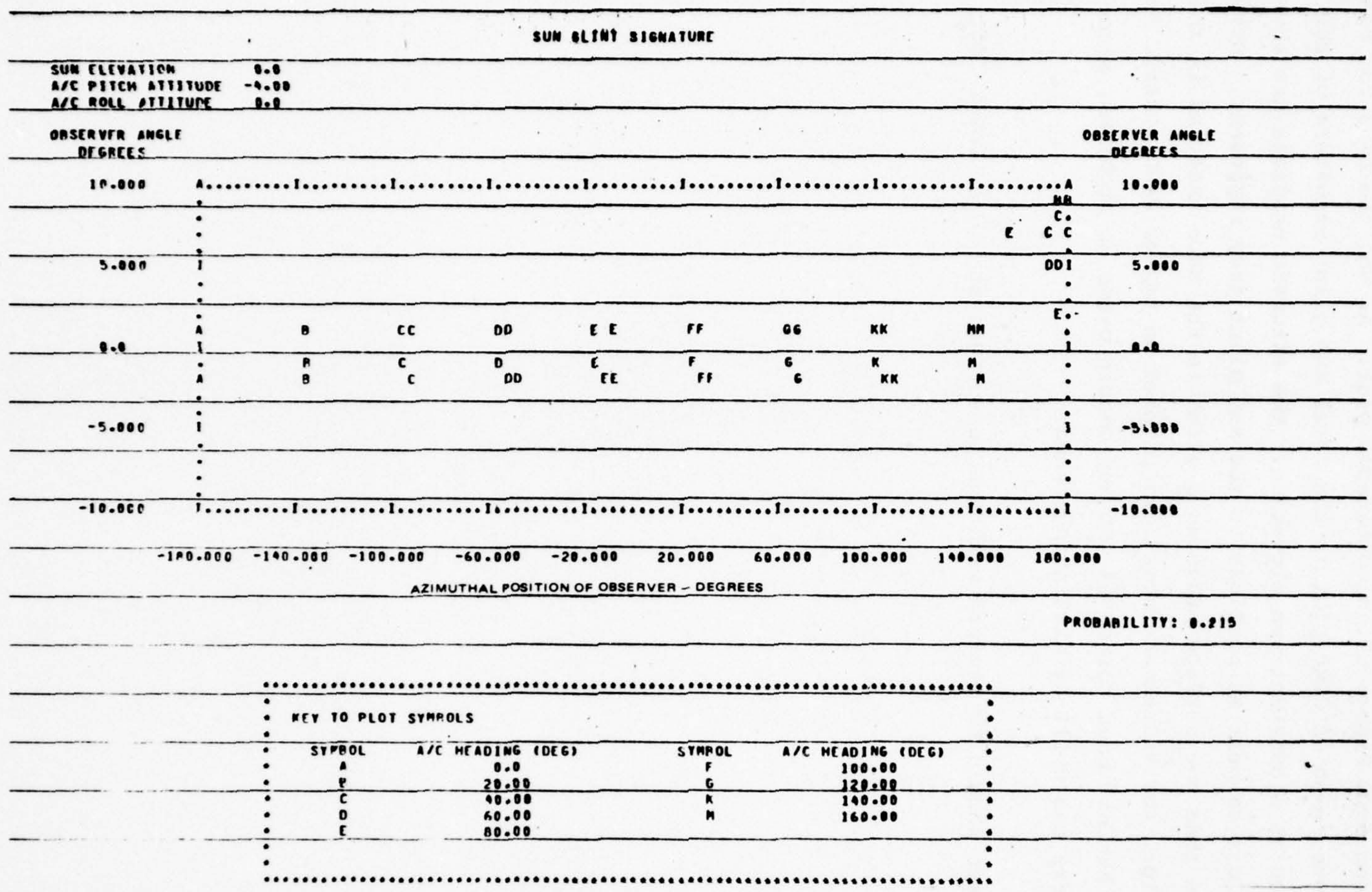


Figure 21. Typical Printout of On-Line Plot.

The fifth and final type of output comes from a CALCOMP plotter. It is, as can be seen from Figure 22, a continuous plot. As was the case for the print plots, each CALCOMP plot is the total sun glint signature of the configuration at a constant sun elevation. The aircraft headings are shown on the plots as near as possible to the sun glint they represent. However, when more than one surface produces a glint in the same area, as in the bottom plot, the values are sometimes printed on top of each other. This nuisance has not been corrected yet but should cause no problems, since the numbers can still be distintinguished.

The plotter should be started with the pen origin at 0,0 or Lower Left.

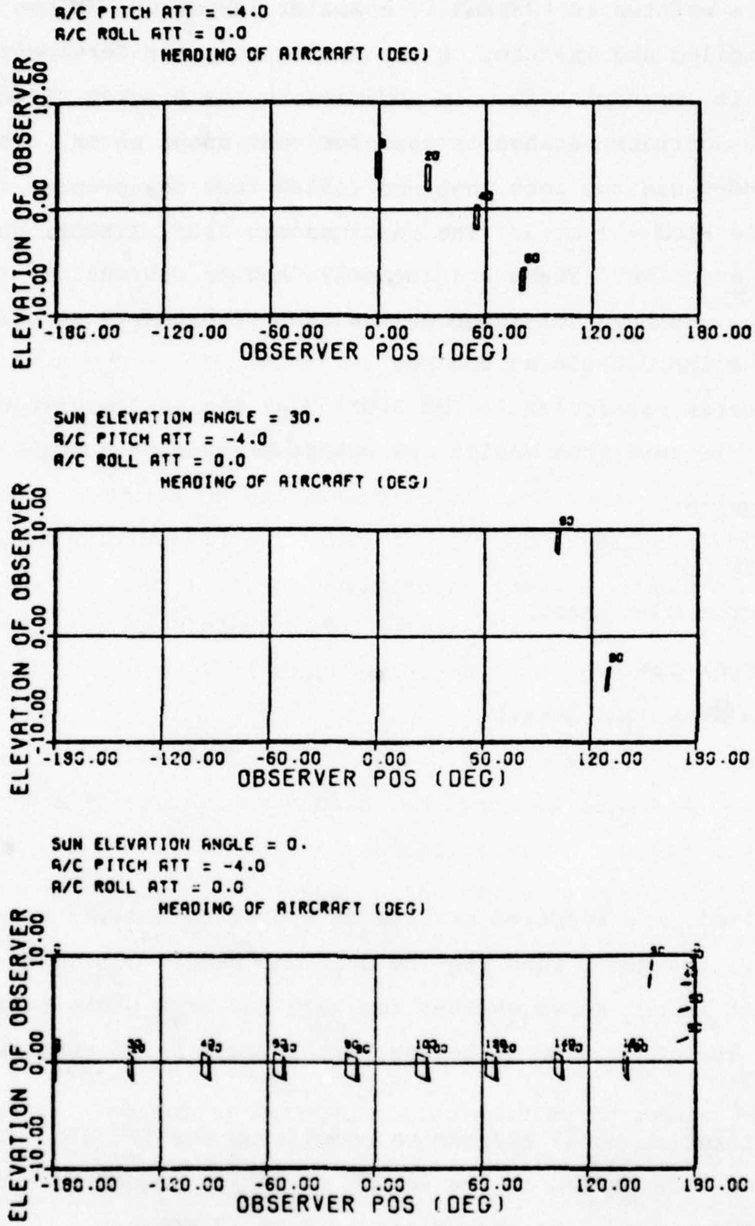


Figure 22. Typical CALCOMP Plot.

RUNNING INSTRUCTIONS

The program is written in FORTRAN IV computer language. It has been successfully compiled and executed on the Boeing Computer Service's IBM 370-158 at Philadelphia, Pennsylvania. In addition to the program itself, the CALCOMP Basic Software package is used for continuous plots. This CALCOMP package includes six routines that are called from the program if the input variable PLOT = 1 or 3. The routines are PLOT, SYMBOL, NUMBER, SCALE, AXIS, and LINE. These are the only CALCOMP subroutines required. The following is a physical setup of the deck required to compile and execute on the IBM 370-158 at Boeing.

```
//   JCL cards particular to IBM 370-158 at Boeing Computer Services.
     Input is read from unit 5 and output printed on unit 6.

//EXEC COMP2GO

//FTC.SYSIN DD*
     (Program goes here.)

//GØ.FT05F001 DD*
     (Data deck goes here.)

/*

//
```

At Boeing Vertol, the compiled program is stored on a disk; therefore, once compiled, any subsequent runs require only the proper JCL cards and the data deck. It is not known whether the user has such a capability, so any reference to the JCL's used at Boeing Vertol could be meaningless.

The program takes about 35 seconds to compile on the IBM 370. Typical execution times, depending on the amount of output requested and the number of conditions analyzed, are approximately 8 to 12 seconds.

As for the form of the input, all titles are read using an alphanumeric format, which allows for the mixing of letters and numbers in the input. The rest of the inputs are read using a floating-point format with 10

columns alloted for each variable. As long as the decimal point is included, the variable may appear anywhere in those 10 columns. The specific location of each variable on the card was shown in Figure 17.

APPENDIX A

SAMPLE CASES

Two sample cases will be discussed to demonstrate the use of the program. The first example deals with the configuration shown in Figure A-1. The panels are all flat. There are six panels, four of them being identified in the isometric. The right-forward and the right-aft panels are hidden from view. The right-forward panel is symmetric to the left-forward panel about the x-z plane of the aircraft. Likewise the right-aft panel is symmetric to the left-aft panel about the x-z plane of the aircraft. There are two fences on the canopy, one over the windshield while the other is over the top panel. Since the surfaces are all flat, as few as three points can be used to locate the boundaries of the surface. The circled letters represent the boundary points selected. In practice, more boundary points may be selected; however, in most cases of flat panels a large number of boundary points is not necessary. Using the three-view drawing shown, the center of rotation and each circled letter can be located referenced to the station, buttline, waterline axes. The panels and fences can then be described by a set of locations as tabulated in Table A-1. For instance, the windshield is defined by the locations of Ⓐ Ⓑ Ⓒ Ⓓ. These are the boundary points that are used by the program.

With the panels and fences defined and the location of the center of rotation known, the next step is to decide on what conditions to analyze. Using Figure 17 as a guide, the first input card would contain the title for this run. The title chosen is FLAT PANELS WITH FENCES SAMPLE CASE I, which will appear on the first card. The second card contains the input variables, DEFLT, PRINT, THETA, and PHI. The default option is chosen (DEFLT = 1.); therefore the optional cards shown in Figure 17 will be omitted. Since all the printout possible is desired, PRINT will be set equal to 2. The aircraft pitch and roll attitudes will be assumed to be zero (THETA = 0. and PHI = 0.). This takes care of the second card. The third card will specify the desired sun elevations and aircraft headings (GAMN, GAMI, DGAM, PSIN, PSII, DPSI). Three sun elevations are chosen, 0, 30, and 60 degrees. Therefore, GAMN will be equal to 3., GAMI will be

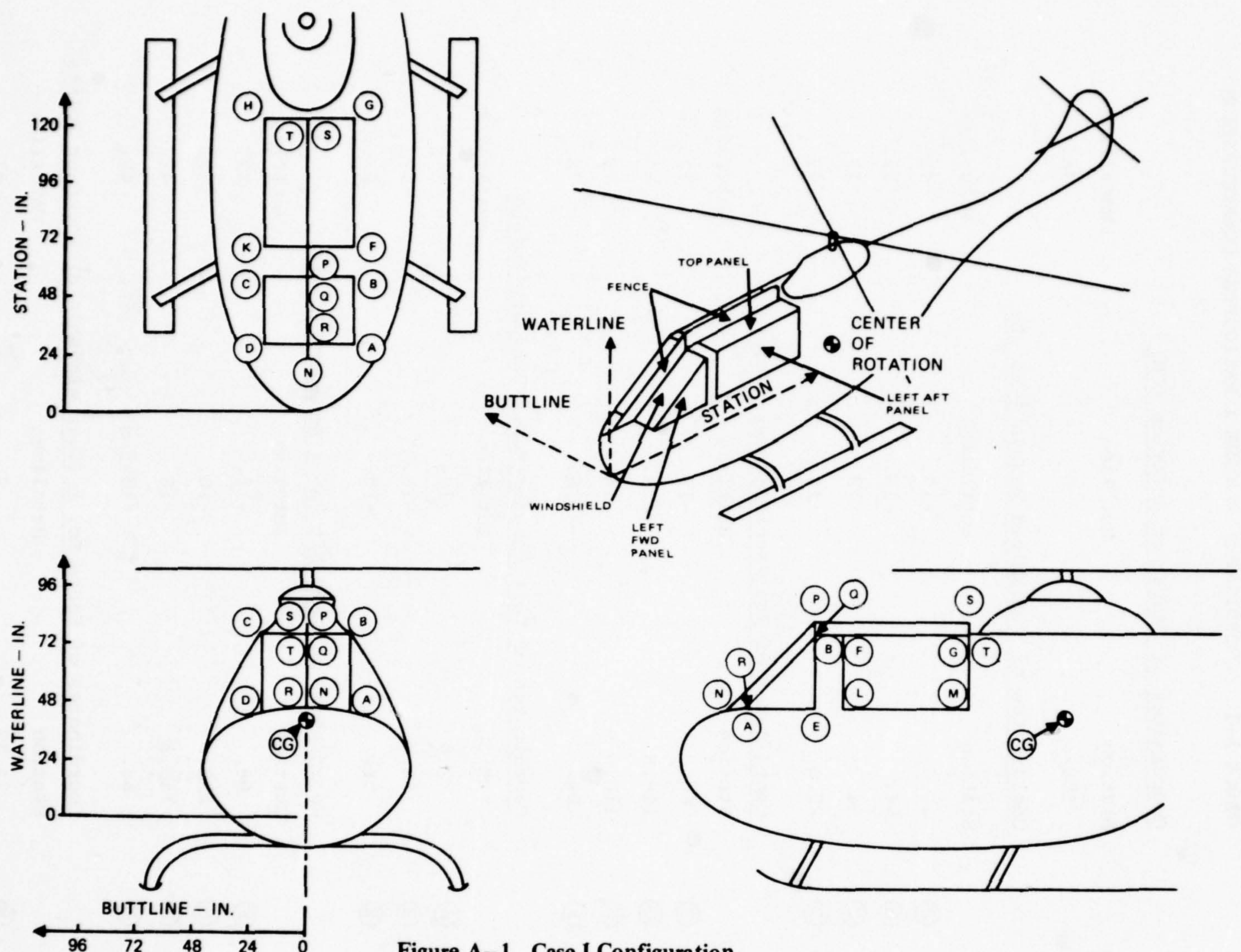


Figure A–1. Case I Configuration.

TABLE A-1. COORDINATES OF CASE I HELICOPTER CONFIGURATION

Coordinates of Center of Rotation (CG)

Station	Buttline	Waterline
150.	0	36.

Coordinates of Windshield Boundary Points

	Station	Buttline	Waterline
A	27.6	-18.	42.
B	54.	-18.	72.
C	54.	18.	72.
D	27.6	18.	42.

Coordinates of Top Panel Boundary Points

	Station	Buttline	Waterline
F	66.	-18.	72.
G	118.8	-18.	72.
H	118.8	18.	72.
K	66.	18.	72.

Coordinates of Left Forward-Panel Boundary Points

	Station	Buttline	Waterline
A	27.6	-18.	42.
B	54.	-18.	72.
E	54.	-18.	42.

Coordinates of Left-Aft Panel Boundary Points

	Station	Buttline	Waterline
F	66.	-18.	72.
G	118.8	-18.	72.
M	118.8	-18.	42.
L	66.	-18.	42.

Coordinates of Fence No. 1 (Over Windshield) Boundary Points

	Station	Buttline	Waterline
N	22.32	0	42.
P	54.	0	78.

TABLE A-1 - Continued

Coordinates of Fence No. 1 - Continued

	Station	Buttline	Waterline
Q	54.	0	72.
R	27.6	0	42.

Coordinates of Fence No. 2 (Over Top Panel) Boundary Points

	Station	Buttline	Waterline
P	54.	0	78.
S	118.8	0	78.
T	118.8	0	72.
Q	54.	0	72.

0., and DGAM will be 30. Aircraft headings shall cover the whole 360-degree range; therefore, PSIN will be equal to 9., PSII = -180., and DPSI = 45. These six values will take care of the third card. The fourth card contains the location of the center of rotation (XROT, YROT, ZROT). These values are measured on Figure A-1 and recorded at the top of Table A-1. The values are XROT = 150., YROT = 0., and ZROT = 36.

This is all the information needed for the fourth card. The fifth card contains the radial distance to all observers (DISTG), the minimum (ELVMIN) and maximum (ELVMAX) elevation angles, and the minimum (AZMMIN) and maximum (AZMMAX) azimuth angles. The distance to the observer will be assumed to be 1,000 feet. The elevation limits on the observers will be ± 10 degrees and the azimuth limits will be ± 180 degrees. Therefore the fifth card has DISTG = 1,000 feet, ELVMIN = -10 degrees, ELVMAX = 10 degrees, AZMMIN = -180 degrees and AZMMAX = 180 degrees. The sixth card contains the number of fences (FENCES), the number of reflective panels (PANELS), the plot option chosen (PLOT), and whether to calculate probability. For this configuration, FENCES = 2. and PANELS = 6. To get both printer-type and CALCOMP-type plots, set PLOT = 3., and to have probability calculated, PROBL = 1. This takes care of the control cards. The next six cards will contain fence data. The seventh card contains the number of boundary points associated with the first fence (over the windshield). There are four points; therefore, on the seventh card FPTS = 4. The eighth and ninth cards contain the four boundary points N P Q R from Table A-1.

The tenth card has the value for the number of boundary points defined for the second fence (over the top panel), FPTS = 4. The eleventh and twelfth cards contain the four boundary points P S T Q. This completes the fence data. The rest of the data cards contain information about the reflective surfaces. The thirteenth card is an identification card for the first reflective surface read in. For this case it is the WINDSHIELD. The fourteenth card is the symmetry card for this surface. Since this is the first surface and therefore data must be read in for it, SYMTRY = 0. Since DEFLT = 1., the optional cards shown in Figure 17 pertaining to selecting

certain terms in the curve-fit equation will be omitted. The fifteenth card contains RPTS, the number of boundary points for this surface; RPTS has a value of 4. The sixteenth and seventeenth cards contain the four boundary points for this surface, A B C D .

This completes the data for the first reflective surface. The next surface to be read in will be the TOP PANEL, so identified on the eighteenth card. The nineteenth card is the symmetry card for this panel. This panel is not symmetric in any way to the windshield; therefore SYMTRY = 0. for this surface. The twentieth card contains the number of boundary points for this panel (RPTS = 4.). The twenty-first and twenty-second cards are for the four boundary points F G H K . This completes the data for the second reflective surface. The next surface to be read in is the LEFT FWD PANEL, so identified on the twenty-third card. This panel is symmetric to the right forward panel, but since it is read in first, SYMTRY = 0 for this surface. The twenty-fourth card is for the number of boundary points recorded for the left-forward surface; this number is three. The twenty-fifth and twenty-sixth cards are used for the three boundary points for this surface, A B E . The next panel to be read in should be the RIGHT FWD PANEL, since it is symmetric to the panel just read in, and therefore only an identification card and symmetry card are required. The twenty-seventh card will contain the identification for the right-forward panel, while the twenty-eighth card is the symmetry card which has a value of one since the right-and left-forward surfaces are symmetric about the x-z plane. The next panel to be read in is the LEFT AFT PANEL, so identified on the twenty-ninth card. Since this panel is not symmetric to the right-forward panel just read in, the symmetry card (the thirtieth card) contains a zero. The thirty-first card represents the number of boundary points for the left-aft panel (RPTS = 4.). The thirty-second and thirty-third cards contain the four boundary points for this surface, F G M L . The next surface to be read in is the RIGHT AFT PANEL, so identified on the thirty-fourth card. Since this surface is symmetric to the surface just read in, namely the left-aft panel, the thirty-fifth card (the symmetry card) will have a value of one, representing symmetry about the x-z

plane. This completes the input data for this case. The complete input in card image form is shown in Figure A-2. The complete results from this input are shown on pages 71 through 116.

```
 FLAT SURFACES WITH FENCES     SAMPLE CASE ONE
1.          2.          0.          0.
3.          0.          30.         9.          -180.       45.
150.        0.          36.
1000.       -10.        10.         -180.       180.
2.          6.          3.          1.
4.
22.32       0.          42.         54.         0.          78.
54.         0.          72.         27.6        0.          42.
4.
54.         0.          78.         118.8       0.          78.
118.8       0.          72.         54.         0.          72.
 WINDSHIELD
0.
4.
27.6        -18.        42.         54.         -18.        72.
54.         18.         72.         27.6        18.         42.
 TOP PANEL
0.
4.
66.         -18.        72.         118.8       -18.        72.
118.8       18.         72.         66.         18.         72.
 LEFT FORWARD PANEL
0.
3.
27.6        -18.        42.         54.         -18.        72.
54.         -18.        42.
RIGHT FORWARD PANEL
1.
LEFT AFT PANEL
0.
4.
66.         -18.        72.         118.8       -18.        72.
118.8       -18.        42.         66.         -18.        42.
RIGHT AFT PANEL
1.
```

Figure A–2. Input for Case I; Card Images.

```
FLAT SURFACES WITH FENCES     SAMPLE CASE ONE
                                                    *** INPUT DATA ***

  **CONTROL OPTIONS
     DEFAULT OPTION         1.         PRINT OPTION          2.
     PLOT OPTION            3.         PROBABILITY OPT       1.

  **AIRCRAFT INITIAL EULER ORIENTATION
     PITCH                  0.0        ROLL                  0.0       YAW                -180.0

  **SELECTED YAW ANGLE ROTATIONS
     NO. OF ANGLES          9.         INITIAL ANGLE      -180.0       ANGLE INCREMENT     45.0

  **SELECTED SUN ELEVATIONS
     NO. OF ANGLES          3.         INITIAL ANGLE         0.0       ANGLE INCREMENT     30.0

  **REFERENCE INFORMATION FOR MEASURING SUN GLINT ANGLES
     REFERENCE POINT FOR MEASURING ANGLES OF GLINT SIGNATURE      DISTANCE AT WHICH GLINT SIGNATURE FORMED (FT.)  1000.000
            X           Y          Z
         150.00        0.0       36.00

  **PLOT SCALING
     GLINT AZIMUTH                     GLINT ELEVATION
       MINIMUM       -180.0              MINIMUM           -10.0
       MAXIMUM        180.0              MAXIMUM            10.0

  **BOUNDARIES FOR CALCULATING PROBABILITY
     GLINT AZIMUTH                     GLINT ELEVATION
       MINIMUM       -180.0              MINIMUM           -10.0
       MAXIMUM        180.0              MAXIMUM            10.0
FLAT SURFACES WITH FENCES     SAMPLE CASE ONE
                                                    *** INPUT DATA ***

  **FENCE DATA
     NO. OF FENCES          2.

     *FENCE NO. 1
       NUMBER OF POINTS       4.

       BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                  X          Y          Z                   X          Y          Z                    X          Y          Z
       ( 1)     22.32       0.0       42.00        ( 2)   54.00       0.0       78.00        ( 3)    54.00       0.0       72.00
       ( 4)     27.60       0.0       42.00

     *FENCE NO. 2
       NUMBER OF POINTS       4.

       BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                  X          Y          Z                   X          Y          Z                    X          Y          Z
       ( 1)     54.00       0.0       78.00        ( 2)  118.80       0.0       78.00        ( 3)   118.80       0.0       72.00
       ( 4)     54.00       0.0       72.00
```

```
FLAT SURFACES WITH FENCES    SAMPLE CASE ONE

                                        *** INPUT DATA ***

 **REFLECTIVE SURFACE DATA
   NO. OF SURFACES      6.

    *REFLECTIVE SURFACE NO.  1      IDENTIFICATION: WINDSHIELD

      CURVE-FIT INPUT DATA
        DESIRED TERMS FOR CURVE-FITTING
          (1) X    TERM    0.       (2) Y    TERM    0.       (3) Z    TERM    0.       (4) XY   TERM    0.       (5) XZ   TERM    0.
          (6) YZ   TERM    0.       (7) XSQ TERM    0.       (8) YSQ TERM    0.       (9) ZSQ TERM    0.

        INPUT VALUES FOR COEFFICIENTS OF SURFACE
          (1) X    COEF     0.0               (2) Y    COEF     0.0               (3) Z    COEF     0.0
          (4) XY   COEF     0.0               (5) XZ   COEF     0.0               (6) YZ   COEF     0.0
          (7) XSQ COEF     0.0               (8) YSQ COEF     0.0               (9) ZSQ COEF     0.0
         (10) CONSTANT     0.0

      BOUNDARY POINTS -- BODY AXES   (STATIONLINE,BUTTLINE,WATERLINE)
                    X          Y          Z                     X          Y          Z                     X          Y          Z
        ( 1)     27.60     -18.00      42.00        ( 2)     54.00     -18.00      72.00        ( 3)     54.00      18.00      72.00
        ( 4)     27.60      18.00      42.00

    *REFLECTIVE SURFACE NO.  2      IDENTIFICATION: TOP PANEL

      CURVE-FIT INPUT DATA
        DESIRED TERMS FOR CURVE-FITTING
          (1) X    TERM    0.       (2) Y    TERM    0.       (3) Z    TERM    0.       (4) XY   TERM    0.       (5) XZ   TERM    0.
          (6) YZ   TERM    0.       (7) XSQ TERM    0.       (8) YSQ TERM    0.       (9) ZSQ TERM    0.

        INPUT VALUES FOR COEFFICIENTS OF SURFACE
          (1) X    COEF     0.0               (2) Y    COEF     0.0               (3) Z    COEF     0.0
          (4) XY   COEF     0.0               (5) XZ   COEF     0.0               (6) YZ   COEF     0.0
          (7) XSQ COEF     0.0               (8) YSQ COEF     0.0               (9) ZSQ COEF     0.0
         (10) CONSTANT     0.0

      BOUNDARY POINTS -- BODY AXES   (STATIONLINE,BUTTLINE,WATERLINE)
                    X          Y          Z                     X          Y          Z                     X          Y          Z
        ( 1)     66.00     -18.00      72.00        ( 2)    118.80     -18.00      72.00        ( 3)    118.80      18.00      72.00
        ( 4)     66.00      18.00      72.00

    *REFLECTIVE SURFACE NO.  3      IDENTIFICATION: LEFT FORWARD PANEL

      CURVE-FIT INPUT DATA
        DESIRED TERMS FOR CURVE-FITTING
          (1) X    TERM    0.       (2) Y    TERM    0.       (3) Z    TERM    0.       (4) XY   TERM    0.       (5) XZ   TERM    0.
          (6) YZ   TERM    0.       (7) XSQ TERM    0.       (8) YSQ TERM    0.       (9) ZSQ TERM    0.
```

```
FLAT SURFACES WITH FENCES     SAMPLE CASE ONE

                                         *** INPUT DATA ***

   *REFLECTIVE SURFACE NO. 3      IDENTIFICATION: LEFT FORWARD PANEL

      INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.0              (2) Y   COEF    0.0              (3) Z   COEF    0.0
        (4) XY  COEF    0.0              (5) XZ  COEF    0.0              (6) YZ  COEF    0.0
        (7) XSQ COEF    0.0              (8) YSQ COEF    0.0              (9) ZSQ COEF    0.0
       (10) CONSTANT    0.0

     BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                 X          Y          Z                    X          Y          Z                    X          Y          Z
      ( 1)     27.60     -18.00      42.00        ( 2)    54.00     -18.00      72.00        ( 3)    54.00     -18.00      42.00

   *REFLECTIVE SURFACE NO. 4      IDENTIFICATION: RIGHT FORWARD PANEL

     CURVE-FIT INPUT DATA
      DESIRED TERMS FOR CURVE-FITTING
        (1) X   TERM   0.     (2) Y   TERM   0.     (3) Z   TERM   0.     (4) XY  TERM   0.     (5) XZ  TERM   0.
        (6) YZ  TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   0.     (9) ZSQ TERM   0.

      INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.0              (2) Y   COEF    0.0              (3) Z   COEF    0.0
        (4) XY  COEF    0.0              (5) XZ  COEF    0.0              (6) YZ  COEF    0.0
        (7) XSQ COEF    0.0              (8) YSQ COEF    0.0              (9) ZSQ COEF    0.0
       (10) CONSTANT    0.0

     BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                 X          Y          Z                    X          Y          Z                    X          Y          Z
      ( 1)     27.60      18.00      42.00        ( 2)    54.00      18.00      72.00        ( 3)    54.00      18.00      42.00

   *REFLECTIVE SURFACE NO. 5      IDENTIFICATION: LEFT AFT PANEL

     CURVE-FIT INPUT DATA
      DESIRED TERMS FOR CURVE-FITTING
        (1) X   TERM   0.     (2) Y   TERM   0.     (3) Z   TERM   0.     (4) XY  TERM   0.     (5) XZ  TERM   0.
        (6) YZ  TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   0.     (9) ZSQ TERM   0.

      INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.0              (2) Y   COEF    0.0              (3) Z   COEF    0.0
        (4) XY  COEF    0.0              (5) XZ  COEF    0.0              (6) YZ  COEF    0.0
        (7) XSQ COEF    0.0              (8) YSQ COEF    0.0              (9) ZSQ COEF    0.0
       (10) CONSTANT    0.0

     BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                 X          Y          Z                    X          Y          Z                    X          Y          Z
      ( 1)     66.00     -18.00      72.00        ( 2)   118.80     -18.00      72.00        ( 3)   118.80     -18.00      42.00
      ( 4)     66.00     -18.00      42.00
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FLAT SURFACES WITH FENCES    SAMPLE CASE ONE

                                     *** INPUT DATA ***

   *REFLECTIVE SURFACE NO. 6     IDENTIFICATION: RIGHT AFT PANEL

     CURVE-FIT INPUT DATA
       DESIRED TERMS FOR CURVE-FITTING
         (1) X   TERM   0.     (2) Y   TERM   0.     (3) Z   TERM   0.     (4) XY  TERM   0.     (5) XZ  TERM   0.
         (6) YZ  TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   0.     (9) ZSQ TERM   0.

       INPUT VALUES FOR COEFFICIENTS OF SURFACE
         (1) X   COEF   0.0             (2) Y   COEF   0.0             (3) Z   COEF   0.0
         (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
         (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
        (10) CONSTANT   0.0

     BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                 X         Y         Z                  X         Y         Z                  X         Y         Z
       ( 1)    66.00     18.00     72.00       ( 2)   118.80     18.00     72.00       ( 3)   118.80     18.00     42.00
       ( 4)    66.00     18.00     42.00

WARNING TEST IN SIGNF SHOWS VECTORS PERPENDICULAR

WARNING TEST IN SIGNF SHOWS VECTORS PERPENDICULAR


FLAT SURFACES WITH FENCES    SAMPLE CASE ONE

                               *** RESULTS OF CURVE-FIT ANALYSIS ***

  **FENCE DATA

    *FENCE NO. 1

       VALUES FOR COEFFICIENTS OF SURFACE
         (1) X   COEF   0.0          (2) Y   COEF   0.1507E-01    (3) Z   COEF   0.0           (4) CONSTANT   0.0

       ROOT MEAN SQUARE ERROR OF FIT=  0.0

    *FENCE NO. 2

       VALUES FOR COEFFICIENTS OF SURFACE
         (1) X   COEF   0.0          (2) Y   COEF   0.2126E-01    (3) Z   COEF   0.0           (4) CONSTANT   0.0

       ROOT MEAN SQUARE ERROR OF FIT=  0.0
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FLAT SURFACES WITH FENCES    SAMPLE CASE ONE
                                                  *** RESULTS OF CURVE-FIT ANALYSIS ***

 **REFLECTIVE SURFACE DATA

   *REFLECTIVE SURFACE NO. 1     IDENTIFICATION: WINDSHIELD

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X    COEF  -0.7832E-02      (2) Y    COEF   0.0            (3) Z    COEF   0.6892E-02
        (4) XY   COEF   0.0             (5) XZ   COEF   0.0            (6) YZ   COEF   0.0
        (7) XSQ COEF    0.0             (8) YSQ COEF    0.0            (9) ZSQ COEF   0.0
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.9813E-17

   *REFLECTIVE SURFACE NO. 2     IDENTIFICATION: TOP PANEL

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X    COEF  -0.9607E-18      (2) Y    COEF   0.0            (3) Z    COEF   0.2778E-01
        (4) XY   COEF   0.0             (5) XZ   COEF   0.0            (6) YZ   COEF   0.0
        (7) XSQ COEF    0.0             (8) YSQ COEF    0.0            (9) ZSQ COEF   0.0
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.2944E-16

   *REFLECTIVE SURFACE NO. 3     IDENTIFICATION: LEFT FORWARD PANEL

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X    COEF  -0.4208E-16      (2) Y    COEF  -0.5556E-01     (3) Z    COEF   0.1989E-16
        (4) XY   COEF   0.0             (5) XZ   COEF   0.0            (6) YZ   COEF   0.0
        (7) XSQ COEF    0.0             (8) YSQ COEF    0.0            (9) ZSQ COEF   0.0
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.3830E-15

   *REFLECTIVE SURFACE NO. 4     IDENTIFICATION: RIGHT FORWARD PANEL

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X    COEF  -0.4208E-16      (2) Y    COEF   0.5556E-01     (3) Z    COEF   0.1989E-16
        (4) XY   COEF   0.0             (5) XZ   COEF   0.0            (6) YZ   COEF   0.0
        (7) XSQ COEF    0.0             (8) YSQ COEF    0.0            (9) ZSQ COEF   0.0
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.3830E-15
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FLAT SURFACES WITH FENCES    SAMPLE CASE ONE

                                        *** RESULTS OF CURVE-FIT ANALYSIS ***

 **REFLECTIVE SURFACE DATA

   *REFLECTIVE SURFACE NO. 5     IDENTIFICATION: LEFT AFT PANEL

     VALUES FOR COEFFICIENTS OF SURFACE
       (1) X   COEF    0.8547E-18       (2) Y   COEF  -0.5556E-01       (3) Z   COEF   0.7348E-17
       (4) XY  COEF    0.0              (5) XZ  COEF   0.0              (6) YZ  COEF   0.0
       (7) XSQ COEF    0.0              (8) YSQ COEF   0.0              (9) ZSQ COEF   0.0
      (10) CONSTANT  -0.1000E 01

     ROOT MEAN SQUARE ERROR OF FIT=  0.9047E-16

   *REFLECTIVE SURFACE NO. 6     IDENTIFICATION: RIGHT AFT PANEL

     VALUES FOR COEFFICIENTS OF SURFACE
       (1) X   COEF    0.8547E-18       (2) Y   COEF   0.5556E-01       (3) Z   COEF   0.7348E-17
       (4) XY  COEF    0.0              (5) XZ  COEF   0.0              (6) YZ  COEF   0.0
       (7) XSQ COEF    0.0              (8) YSQ COEF   0.0              (9) ZSQ COEF   0.0
      (10) CONSTANT  -0.1000E 01

     ROOT MEAN SQUARE ERROR OF FIT=  0.9047E-16
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FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 1   IDENTIFICATION: WINDSHIELD

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	27.60	-18.00	42.00	1	0	0	8.98	-82.70
-180.00	54.00	-18.00	72.00	1	0	0	8.97	-82.68
-180.00	54.00	18.00	72.00	1	0	0	8.79	-82.68
-180.00	27.60	18.00	42.00	1	0	0	8.81	-82.70
-135.00	27.60	-18.00	42.00	1	0	0	128.34	-44.51
-135.00	54.00	-18.00	72.00	1	0	0	128.22	-44.43
-135.00	54.00	18.00	72.00	1	0	0	128.20	-44.52
-135.00	27.60	18.00	42.00	1	0	0	128.32	-44.60
-90.00	27.60	-18.00	42.00	0	1	0	-178.29	1.02
-90.00	54.00	-18.00	72.00	0	1	0	-178.41	1.16
-90.00	54.00	18.00	72.00	0	0	1	-178.41	1.17
-90.00	27.60	18.00	42.00	0	0	1	-178.29	1.02
-45.00	27.60	-18.00	42.00	0	0	0	-127.19	44.47
-45.00	54.00	-18.00	72.00	0	0	0	-127.31	44.55
-45.00	54.00	18.00	72.00	0	0	0	-127.29	44.64
-45.00	27.60	18.00	42.00	0	0	0	-127.16	44.56
0.0	27.60	-18.00	42.00	0	0	0	-0.09	82.62
0.0	54.00	-18.00	72.00	0	0	0	-0.09	82.64
0.0	54.00	18.00	72.00	0	0	0	0.09	82.64
0.0	27.60	18.00	42.00	0	0	0	0.09	82.62
45.00	27.60	-18.00	42.00	0	0	0	127.16	44.56
45.00	54.00	-18.00	72.00	0	0	0	127.29	44.64
45.00	54.00	18.00	72.00	0	0	0	127.31	44.55

45.00	27.60	18.00	42.00	0	0	0	127.19	44.47
90.00	27.60	-18.00	42.00	0	0	1	178.29	1.02
90.00	54.00	-18.00	72.00	0	0	1	178.41	1.17
90.00	54.00	18.00	72.00	0	1	0	178.41	1.16
90.00	27.60	18.00	42.00	0	1	0	178.29	1.02
135.00	27.60	-18.00	42.00	1	0	0	-128.32	-44.60
135.00	54.00	-18.00	72.00	1	0	0	-128.20	-44.52
135.00	54.00	18.00	72.00	1	0	0	-128.22	-44.43
135.00	27.60	18.00	42.00	1	0	0	-128.34	-44.51
180.00	27.60	-18.00	42.00	1	0	0	-8.81	-82.70
180.00	54.00	-18.00	72.00	1	0	0	-8.79	-82.68
180.00	54.00	18.00	72.00	1	0	0	-8.97	-82.68
180.00	27.60	18.00	42.00	1	0	0	-8.98	-82.70

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 2   IDENTIFICATION: TOP PANEL

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	66.00	-18.00	72.00	0	0	0	179.92	0.17
-180.00	118.80	-18.00	72.00	0	0	0	179.92	0.17
-180.00	118.80	18.00	72.00	0	0	0	-179.91	0.17
-180.00	66.00	18.00	72.00	0	0	0	-179.91	0.17
-135.00	66.00	-18.00	72.00	0	0	0	-179.78	0.17
-135.00	118.80	-18.00	72.00	0	0	0	-179.96	0.17
-135.00	118.80	18.00	72.00	0	0	0	-179.83	0.17
-135.00	66.00	18.00	72.00	0	0	0	-179.66	0.17
-90.00	66.00	-18.00	72.00	0	0	0	-179.60	0.17
-90.00	118.80	-18.00	72.00	0	0	0	-179.85	0.17
-90.00	118.80	18.00	72.00	0	0	0	-179.85	0.17
-90.00	66.00	18.00	72.00	0	0	0	-179.60	0.17
-45.00	66.00	-18.00	72.00	0	0	0	-179.66	0.17
-45.00	118.80	-18.00	72.00	0	0	0	-179.83	0.17
-45.00	118.80	18.00	72.00	0	0	0	-179.96	0.17
-45.00	66.00	18.00	72.00	0	0	0	-179.78	0.17
0.0	66.00	-18.00	72.00	0	0	0	-179.91	0.17
0.0	118.80	-18.00	72.00	0	0	0	-179.91	0.17
0.0	118.80	18.00	72.00	0	0	0	179.91	0.17
0.0	66.00	18.00	72.00	0	0	0	179.91	0.17
45.00	66.00	-18.00	72.00	0	0	0	179.78	0.17
45.00	118.80	-18.00	72.00	0	0	0	179.96	0.17
45.00	118.80	18.00	72.00	0	0	0	179.83	0.17

45.00	66.00	18.00	72.00	0	0	0	179.66	0.17
90.00	66.00	-18.00	72.00	0	0	0	179.60	0.17
90.00	118.80	-18.00	72.00	0	0	0	179.85	0.17
90.00	118.80	18.00	72.00	0	0	0	179.85	0.17
90.00	66.00	18.00	72.00	0	0	0	179.60	0.17
135.00	66.00	-18.00	72.00	0	0	0	179.66	0.17
135.00	118.80	-18.00	72.00	0	0	0	179.83	0.17
135.00	118.80	18.00	72.00	0	0	0	179.96	0.17
135.00	66.00	18.00	72.00	0	0	0	179.78	0.17
180.00	66.00	-18.00	72.00	0	0	0	179.91	0.17
180.00	118.80	-18.00	72.00	0	0	0	179.91	0.17
180.00	118.80	18.00	72.00	0	0	0	-179.92	0.17
180.00	66.00	18.00	72.00	0	0	0	-179.92	0.17

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 3   IDENTIFICATION: LEFT FORWARD PANEL

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	GLINT ELEVATION
-180.00	27.60	-18.00	42.00	1	0	0	-178.10	0.03
-180.00	54.00	-18.00	72.00	1	0	0	-178.09	0.17
-180.00	54.00	-18.00	42.00	1	0	0	-178.09	0.03
-135.00	27.60	-18.00	42.00	1	0	0	-90.47	0.03
-135.00	54.00	-18.00	72.00	1	0	0	-90.38	0.17
-135.00	54.00	-18.00	42.00	1	0	0	-90.38	0.03
-90.00	27.60	-18.00	42.00	1	1	0	1.42	0.03
-90.00	54.00	-18.00	72.00	1	1	0	1.54	0.17
-90.00	54.00	-18.00	42.00	1	0	0	1.54	0.03
-45.00	27.60	-18.00	42.00	1	0	0	89.65	0.03
-45.00	54.00	-18.00	72.00	1	0	0	89.74	0.17
-45.00	54.00	-18.00	42.00	1	0	0	89.74	0.03
0.0	27.60	-18.00	42.00	0	0	0	-179.91	0.03
0.0	54.00	-18.00	72.00	0	0	0	-179.91	0.17
0.0	54.00	-18.00	42.00	0	0	0	-179.91	0.03
45.00	27.60	-18.00	42.00	0	0	0	-89.53	0.03
45.00	54.00	-18.00	72.00	0	0	0	-89.62	0.17
45.00	54.00	-18.00	42.00	0	0	0	-89.62	0.03
90.00	27.60	-18.00	42.00	0	0	0	-1.41	0.03
90.00	54.00	-18.00	72.00	0	0	0	-1.54	0.17
90.00	54.00	-18.00	42.00	0	0	0	-1.54	0.03
135.00	27.60	-18.00	42.00	0	0	0	90.35	0.03
135.00	54.00	-18.00	72.00	0	0	0	90.26	0.17

135.00	54.00	-18.00	42.00	0	0	0	90.26	0.03
180.00	27.60	-18.00	42.00	0	0	0	177.92	0.03
180.00	54.00	-18.00	72.00	0	0	0	177.92	0.17
180.00	54.00	-18.00	42.00	0	0	0	177.92	0.03

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 4   IDENTIFICATION: RIGHT FORWARD PANEL

SUN ELEVATION   0.0
A/C PITCH ATTITUDE   0.0
A/C ROLL ATTITUDE   0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE, BUTTLINE, WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	27.60	18.00	42.00	0	0	0	-177.92	0.03
-180.00	54.00	18.00	72.00	0	0	0	-177.92	0.17
-180.00	54.00	18.00	42.00	0	0	0	-177.92	0.03
-135.00	27.60	18.00	42.00	0	0	0	-90.35	0.03
-135.00	54.00	18.00	72.00	0	0	0	-90.26	0.17
-135.00	54.00	18.00	42.00	0	0	0	-90.26	0.03
-90.00	27.60	18.00	42.00	0	0	0	1.41	0.03
-90.00	54.00	18.00	72.00	0	0	0	1.54	0.17
-90.00	54.00	18.00	42.00	0	0	0	1.54	0.03
-45.00	27.60	18.00	42.00	0	0	0	89.53	0.03
-45.00	54.00	18.00	72.00	0	0	0	89.62	0.17
-45.00	54.00	18.00	42.00	0	0	0	89.62	0.03
0.0	27.60	18.00	42.00	0	0	0	179.91	0.03
0.0	54.00	18.00	72.00	0	0	0	179.91	0.17
0.0	54.00	18.00	42.00	0	0	0	179.91	0.03
45.00	27.60	18.00	42.00	1	0	0	-89.65	0.03
45.00	54.00	18.00	72.00	1	0	0	-89.74	0.17
45.00	54.00	18.00	42.00	1	0	0	-89.74	0.03
90.00	27.60	18.00	42.00	1	1	0	-1.42	0.03
90.00	54.00	18.00	72.00	1	1	0	-1.54	0.17
90.00	54.00	18.00	42.00	1	0	0	-1.54	0.03
135.00	27.60	18.00	42.00	1	0	0	90.47	0.03
135.00	54.00	18.00	72.00	1	0	0	90.38	0.17

135.00	54.00	18.00	42.00	1	0	0	90.36	0.03
180.00	27.60	18.00	42.00	1	0	0	178.10	0.03
180.00	54.00	18.00	72.00	1	0	0	178.09	0.17
180.00	54.00	18.00	42.00	1	0	0	178.09	0.03

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 5   IDENTIFICATION: LEFT AFT PANEL

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE, BUTTLINE, WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	66.00	-18.00	72.00	1	0	0	-178.09	0.17
-180.00	118.80	-18.00	72.00	1	0	0	-178.09	0.17
-180.00	118.80	-18.00	42.00	1	0	0	-178.09	0.03
-180.00	66.00	-18.00	42.00	1	0	0	-178.09	0.03
-135.00	66.00	-18.00	72.00	1	0	0	-90.34	0.17
-135.00	118.80	-18.00	72.00	1	0	0	-90.17	0.17
-135.00	118.80	-18.00	42.00	1	0	0	-90.17	0.03
-135.00	66.00	-18.00	42.00	1	0	0	-90.34	0.03
-90.00	66.00	-18.00	72.00	1	0	0	1.60	0.17
-90.00	118.80	-18.00	72.00	1	0	0	1.85	0.17
-90.00	118.80	-18.00	42.00	1	0	0	1.85	0.03
-90.00	66.00	-18.00	42.00	1	0	0	1.60	0.03
-45.00	66.00	-18.00	72.00	1	0	0	89.78	0.17
-45.00	118.80	-18.00	72.00	1	0	0	89.96	0.17
-45.00	118.80	-18.00	42.00	1	0	0	89.96	0.03
-45.00	66.00	-18.00	42.00	1	0	0	89.78	0.03
0.0	66.00	-18.00	72.00	0	0	0	-179.91	0.17
0.0	118.80	-18.00	72.00	0	0	0	-179.91	0.17
0.0	118.80	-18.00	42.00	0	0	0	-179.91	0.03
0.0	66.00	-18.00	42.00	0	0	0	-179.91	0.03
45.00	66.00	-18.00	72.00	0	0	0	-89.66	0.17
45.00	118.80	-18.00	72.00	0	0	0	-89.83	0.17
45.00	118.80	-18.00	42.00	0	0	0	-89.83	0.03

45.00	66.00	-18.00	42.00	0	0	0	-89.66	0.03
90.00	66.00	-18.00	72.00	0	0	0	-1.60	0.17
90.00	118.80	-18.00	72.00	0	0	0	-1.85	0.17
90.00	118.80	-18.00	42.00	0	0	0	-1.85	0.03
90.00	66.00	-18.00	42.00	0	0	0	-1.60	0.03
135.00	66.00	-18.00	72.00	0	0	0	90.22	0.17
135.00	118.80	-18.00	72.00	0	0	0	90.04	0.17
135.00	118.80	-18.00	42.00	0	0	0	90.04	0.03
135.00	66.00	-18.00	42.00	0	0	0	90.22	0.03
180.00	66.00	-18.00	72.00	0	0	0	177.92	0.17
180.00	118.80	-18.00	72.00	0	0	0	177.92	0.17
180.00	118.80	-18.00	42.00	0	0	0	177.92	0.03
180.00	66.00	-18.00	42.00	0	0	0	177.92	0.03

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 6   IDENTIFICATION: RIGHT AFT PANEL

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

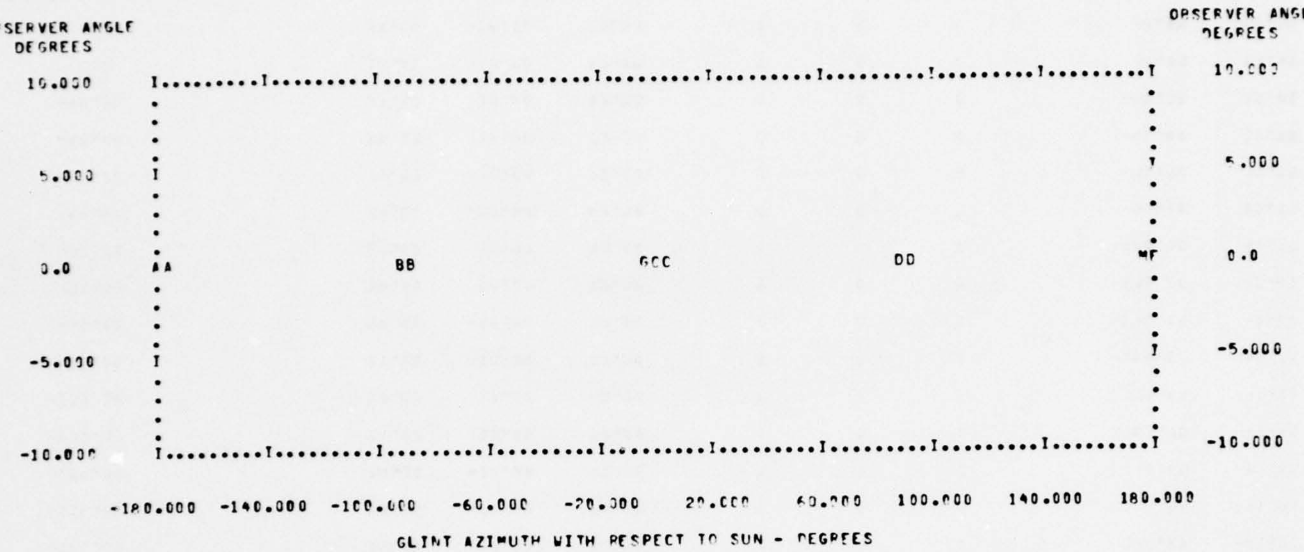
A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	66.00	18.00	72.00	0	0	0	-177.92	0.17
-180.00	118.80	18.00	72.00	0	0	0	-177.92	0.17
-180.00	118.80	18.00	42.00	0	0	0	-177.92	0.03
-180.00	66.00	18.00	42.00	0	0	0	-177.92	0.03
-135.00	66.00	18.00	72.00	0	0	0	-90.22	0.17
-135.00	118.80	18.00	72.00	0	0	0	-90.04	0.17
-135.00	118.80	18.00	42.00	0	0	0	-90.04	0.03
-135.00	66.00	18.00	42.00	0	0	0	-90.22	0.03
-90.00	66.00	18.00	72.00	0	0	0	1.60	0.17
-90.00	118.80	18.00	72.00	0	0	0	1.85	0.17
-90.00	118.80	18.00	42.00	0	0	0	1.85	0.03
-90.00	66.00	18.00	42.00	0	0	0	1.60	0.03
-45.00	66.00	18.00	72.00	0	0	0	89.66	0.17
-45.00	118.80	18.00	72.00	0	0	0	89.83	0.17
-45.00	118.80	18.00	42.00	0	0	0	89.83	0.03
-45.00	66.00	18.00	42.00	0	0	0	89.66	0.03
0.0	66.00	18.00	72.00	0	0	0	179.91	0.17
0.0	118.80	18.00	72.00	0	0	0	179.91	0.17
0.0	118.80	18.00	42.00	0	0	0	179.91	0.03
0.0	66.00	18.00	42.00	0	0	0	179.91	0.03
45.00	66.00	18.00	72.00	1	0	0	-89.78	0.17
45.00	118.80	18.00	72.00	1	0	0	-89.96	0.17
45.00	118.80	18.00	42.00	1	0	0	-89.96	0.03

45.00	66.00	18.00	42.00	1	0	0	-89.78	0.03
90.00	66.00	18.00	72.00	1	0	0	-1.60	0.17
90.00	118.80	18.00	72.00	1	0	0	-1.85	0.17
90.00	118.80	18.00	42.00	1	0	0	-1.85	0.03
90.00	66.00	18.00	42.00	1	0	0	-1.60	0.03
135.00	66.00	18.00	72.00	1	0	0	90.34	0.17
135.00	118.80	18.00	72.00	1	0	0	90.17	0.17
135.00	118.80	18.00	42.00	1	0	0	90.17	0.03
135.00	66.00	18.00	42.00	1	0	0	90.34	0.03
180.00	66.00	18.00	72.00	1	0	0	178.09	0.17
180.00	118.80	18.00	72.00	1	0	0	178.09	0.17
180.00	118.80	18.00	42.00	1	0	0	178.09	0.03
180.00	66.00	18.00	42.00	1	0	0	178.09	0.03

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

SUN GLINT SIGNATURE

SUN ELEVATION   0.0
A/C PITCH ATTITUDE   0.0
A/C ROLL ATTITUDE   0.0



PROBABILITY: 0.064

KEY TO PLOT SYMBOLS

SYMBOL	A/C HEADING (DEG)	SYMBOL	A/C HEADING (DEG)
A	-180.00	F	45.00
B	-135.00	G	90.00
C	-90.00	K	135.00
D	-45.00	H	180.00
E	0.0		

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 1   IDENTIFICATION: WINDSHIELD

SUN ELEVATION 30.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	27.60	-18.00	42.00	1	0	0	178.69	-67.07
-180.00	54.00	-18.00	72.00	1	0	0	178.69	-67.09
-180.00	54.00	18.00	72.00	1	0	0	178.86	-67.10
-180.00	27.60	18.00	42.00	1	0	0	178.87	-67.07
-135.00	27.60	-18.00	42.00	1	0	0	169.76	-41.93
-135.00	54.00	-18.00	72.00	1	0	0	169.65	-41.88
-135.00	54.00	18.00	72.00	1	0	0	169.75	-41.95
-135.00	27.60	18.00	42.00	1	0	0	169.85	-42.00
-90.00	27.60	-18.00	42.00	0	0	0	-148.64	-2.74
-90.00	54.00	-18.00	72.00	0	0	0	-148.75	-2.60
-90.00	54.00	18.00	72.00	0	0	0	-148.66	-2.61
-90.00	27.60	18.00	42.00	0	0	0	-148.55	-2.75
-45.00	27.60	-18.00	42.00	0	0	0	-91.49	32.75
-45.00	54.00	-18.00	72.00	0	0	0	-91.59	32.89
-45.00	54.00	18.00	72.00	0	0	0	-91.47	32.95
-45.00	27.60	18.00	42.00	0	0	0	-91.38	32.81
0.0	27.60	-18.00	42.00	0	0	0	-0.09	52.42
0.0	54.00	-18.00	72.00	0	0	0	-0.09	52.54
0.0	54.00	18.00	72.00	0	0	0	0.09	52.54
0.0	27.60	18.00	42.00	0	0	0	0.09	52.42
45.00	27.60	-18.00	42.00	0	0	0	91.38	32.81
45.00	54.00	-18.00	72.00	0	0	0	91.47	32.95
45.00	54.00	18.00	72.00	0	0	0	91.59	32.89

45.00	27.60	18.00	42.00	0	0	0	91.49	32.75
90.00	27.60	-18.00	42.00	0	0	0	148.55	-2.75
90.00	54.00	-18.00	72.00	0	0	0	148.66	-2.61
90.00	54.00	18.00	72.00	0	0	0	148.75	-2.60
90.00	27.60	18.00	42.00	0	0	0	148.64	-2.74
135.00	27.60	-18.00	42.00	1	0	0	-169.85	-42.00
135.00	54.00	-18.00	72.00	1	0	0	-169.75	-41.95
135.00	54.00	18.00	72.00	1	0	0	-169.65	-41.98
135.00	27.60	18.00	42.00	1	0	0	-169.76	-41.93
180.00	27.60	-18.00	42.00	1	0	0	-178.87	-67.07
180.00	54.00	-18.00	72.00	1	0	0	-178.86	-67.10
180.00	54.00	18.00	72.00	1	0	0	-178.69	-67.09
180.00	27.60	18.00	42.00	1	0	0	-178.69	-67.07

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 2   IDENTIFICATION: TOP PANEL

SUN ELEVATION 30.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	66.00	-18.00	72.00	0	0	0	179.92	29.95
-180.00	118.80	-18.00	72.00	0	0	0	179.92	30.06
-180.00	118.80	18.00	72.00	0	0	0	-179.91	30.06
-180.00	66.00	18.00	72.00	0	0	0	-179.91	29.96
-135.00	66.00	-18.00	72.00	0	0	0	-179.78	29.98
-135.00	118.80	-18.00	72.00	0	0	0	-179.96	30.06
-135.00	118.80	18.00	72.00	0	0	0	-179.83	30.11
-135.00	66.00	18.00	72.00	0	0	0	-179.66	30.03
-90.00	66.00	-18.00	72.00	0	0	0	-179.60	30.09
-90.00	118.80	-18.00	72.00	0	0	0	-179.85	30.09
-90.00	118.80	18.00	72.00	0	0	0	-179.85	30.17
-90.00	66.00	18.00	72.00	0	0	0	-179.60	30.17
-45.00	66.00	-18.00	72.00	0	0	0	-179.66	30.22
-45.00	118.80	-18.00	72.00	0	0	0	-179.83	30.15
-45.00	118.80	18.00	72.00	0	0	0	-179.96	30.20
-45.00	66.00	18.00	72.00	0	0	0	-179.78	30.28
0.0	66.00	-18.00	72.00	0	0	0	-179.91	30.30
0.0	118.80	-18.00	72.00	0	0	0	-179.91	30.19
0.0	118.80	18.00	72.00	0	0	0	179.91	30.19
0.0	66.00	18.00	72.00	0	0	0	179.91	30.30
45.00	66.00	-18.00	72.00	0	0	0	179.78	30.28
45.00	118.80	-18.00	72.00	0	0	0	179.96	30.20
45.00	118.80	18.00	72.00	0	0	0	179.83	30.15

45.00	66.00	18.00	72.00	0	0	0	179.66	30.22
90.00	66.00	-18.00	72.00	0	0	0	179.60	30.17
90.00	118.80	-18.00	72.00	0	0	0	179.85	30.17
90.00	118.80	18.00	72.00	0	0	0	179.85	30.09
90.00	66.00	18.00	72.00	0	0	0	179.60	30.09
135.00	66.00	-18.00	72.00	0	0	0	179.66	30.03
135.00	118.80	-18.00	72.00	0	0	0	179.83	30.11
135.00	118.80	18.00	72.00	0	0	0	179.96	30.06
135.00	66.00	18.00	72.00	0	0	0	179.78	29.98
180.00	66.00	-18.00	72.00	0	0	0	179.91	29.96
180.00	118.80	-18.00	72.00	0	0	0	179.91	30.06
180.00	118.80	18.00	72.00	0	0	0	-179.92	30.06
180.00	66.00	18.00	72.00	0	0	0	-179.92	29.95

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 3   IDENTIFICATION: LEFT FORWARD PANEL

SUN ELEVATION 30.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTFF	GLINT AZIMUTH	GLINT ELEVATION
-180.00	27.60	-18.00	42.00	1	0	0	-178.10	-29.73
-180.00	54.00	-18.00	72.00	1	0	0	-178.09	-29.67
-180.00	54.00	-18.00	42.00	1	0	0	-178.09	-29.78
-135.00	27.60	-18.00	42.00	1	0	0	-90.47	-29.82
-135.00	54.00	-18.00	72.00	1	0	1	-90.38	-29.76
-135.00	54.00	-18.00	42.00	1	0	0	-90.38	-29.86
-90.00	27.60	-18.00	42.00	1	0	0	1.42	-30.02
-90.00	54.00	-18.00	72.00	1	0	0	1.54	-29.91
-90.00	54.00	-18.00	42.00	1	0	0	1.54	-30.02
-45.00	27.60	-18.00	42.00	1	0	0	89.65	-30.18
-45.00	54.00	-18.00	72.00	1	0	0	89.74	-30.04
-45.00	54.00	-18.00	42.00	1	1	0	89.74	-30.14
0.0	27.60	-18.00	42.00	0	0	0	-179.91	-30.23
0.0	54.00	-18.00	72.00	0	0	0	-179.91	-30.07
0.0	54.00	-18.00	42.00	0	0	0	-179.91	-30.18
45.00	27.60	-18.00	42.00	0	0	0	-89.53	-30.13
45.00	54.00	-18.00	72.00	0	0	0	-89.62	-29.98
45.00	54.00	-18.00	42.00	0	0	0	-89.62	-30.09
90.00	27.60	-18.00	42.00	0	0	0	-1.41	-29.94
90.00	54.00	-18.00	72.00	0	0	0	-1.54	-29.84
90.00	54.00	-18.00	42.00	0	0	0	-1.54	-29.94
135.00	27.60	-18.00	42.00	0	0	0	90.35	-29.77
135.00	54.00	-18.00	72.00	0	0	0	90.26	-29.70

135.00	54.00	-18.00	42.00	0	0	0	90.26	-29.81
180.00	27.60	-18.00	42.00	0	0	0	177.92	-29.72
180.00	54.00	-18.00	72.00	0	0	0	177.92	-29.67
180.00	54.00	-18.00	42.00	0	0	0	177.92	-29.78

AD-A061 322 BOEING VERTOL CO PHILADELPHIA PA F/G 1/3

CANOPY SUN GLINT EVALUATION COMPUTER PROGRAM.(U)

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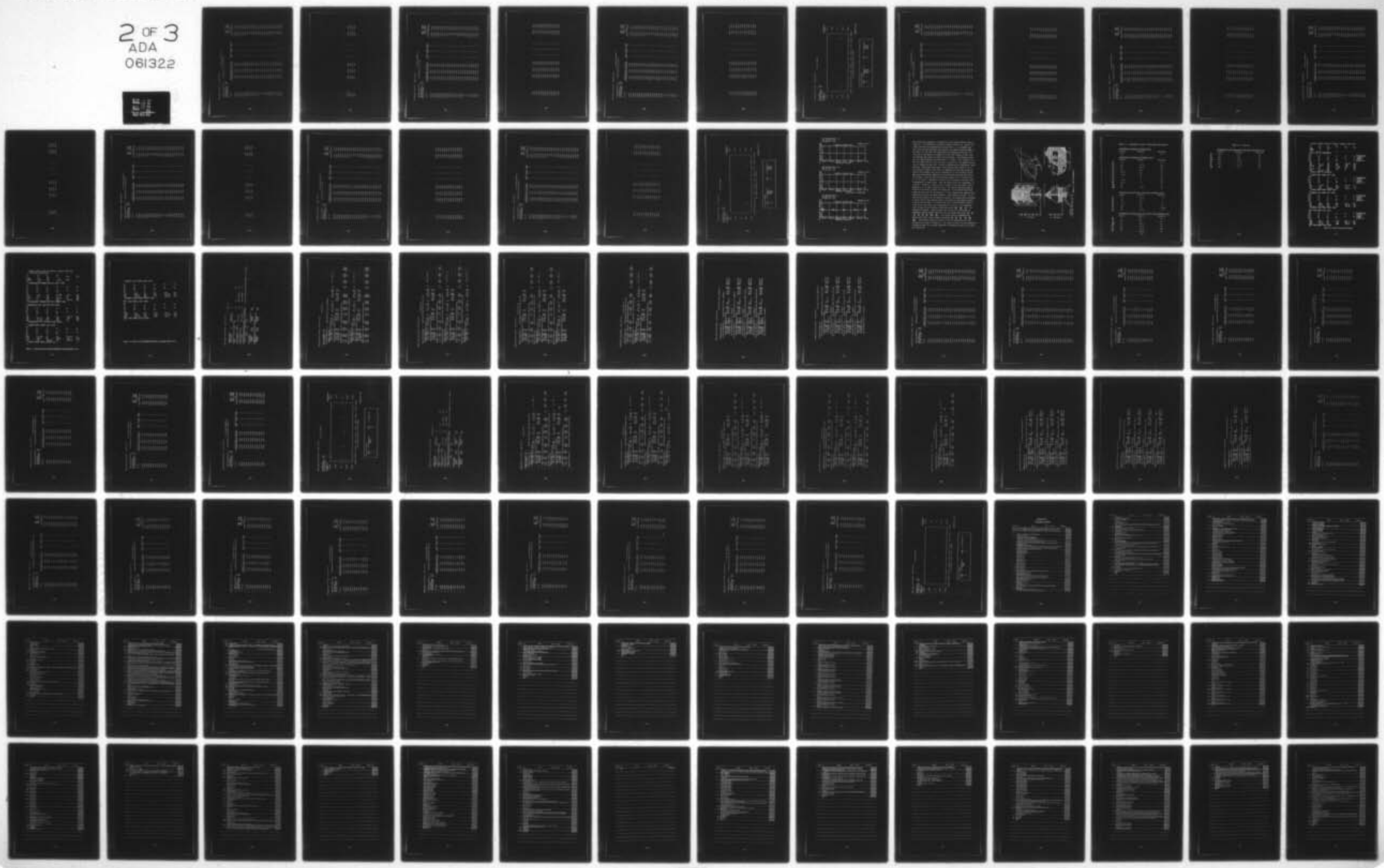


FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 4   IDENTIFICATION: RIGHT FORWARD PANEL

SUN ELEVATION 30.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	27.60	18.00	42.00	0	0	0	-177.92	-29.72
-180.00	54.00	18.00	72.00	0	0	0	-177.92	-29.67
-180.00	54.00	18.00	42.00	0	0	0	-177.92	-29.78
-135.00	27.60	18.00	42.00	0	0	0	-90.35	-29.77
-135.00	54.00	18.00	72.00	0	0	0	-90.26	-29.70
-135.00	54.00	18.00	42.00	0	0	0	-90.26	-29.81
-90.00	27.60	18.00	42.00	0	0	0	1.41	-29.94
-90.00	54.00	18.00	72.00	0	0	0	1.54	-29.84
-90.00	54.00	18.00	42.00	0	0	0	1.54	-29.94
-45.00	27.60	18.00	42.00	0	0	0	89.53	-30.13
-45.00	54.00	18.00	72.00	0	0	0	89.62	-29.98
-45.00	54.00	18.00	42.00	0	0	0	89.62	-30.09
0.0	27.60	18.00	42.00	0	0	0	179.91	-30.23
0.0	54.00	18.00	72.00	0	0	0	179.91	-30.07
0.0	54.00	18.00	42.00	0	0	0	179.91	-30.18
45.00	27.60	18.00	42.00	1	0	0	-89.65	-30.18
45.00	54.00	18.00	72.00	1	0	0	-89.74	-30.04
45.00	54.00	18.00	42.00	1	1	0	-89.74	-30.14
90.00	27.60	18.00	42.00	1	0	0	-1.42	-30.02
90.00	54.00	18.00	72.00	1	0	0	-1.54	-29.91
90.00	54.00	18.00	42.00	1	0	0	-1.54	-30.02
135.00	27.60	18.00	42.00	1	0	0	90.47	-29.82
135.00	54.00	18.00	72.00	1	0	1	90.38	-29.76

135.00	54.00	18.00	42.00	1	0	0	90.38	-29.86
180.00	27.60	18.00	42.00	1	0	0	178.10	-29.73
180.00	54.00	18.00	72.00	1	0	0	178.09	-29.67
180.00	54.00	18.00	42.00	1	0	0	178.09	-29.78

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 5   IDENTIFICATION: LEFT AFT PANEL

SUN ELEVATION 30.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE, BUTTLINE, WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	GLINT ELEVATION
-180.00	66.00	-18.00	72.00	1	0	0	-178.09	-29.70
-180.00	118.80	-18.00	72.00	1	0	0	-178.09	-29.81
-180.00	118.80	-18.00	42.00	1	0	0	-178.09	-29.91
-180.00	66.00	-18.00	42.00	1	0	0	-178.09	-29.81
-135.00	66.00	-18.00	72.00	1	0	0	-90.34	-29.77
-135.00	118.80	-18.00	72.00	1	0	0	-90.17	-29.85
-135.00	118.80	-18.00	42.00	1	0	0	-90.17	-29.96
-135.00	66.00	-18.00	42.00	1	0	0	-90.34	-29.88
-90.00	66.00	-18.00	72.00	1	0	0	1.60	-29.91
-90.00	118.80	-18.00	72.00	1	0	0	1.85	-29.91
-90.00	118.80	-18.00	42.00	1	0	0	1.85	-30.02
-90.00	66.00	-18.00	42.00	1	0	0	1.60	-30.02
-45.00	66.00	-18.00	72.00	1	0	0	89.78	-30.02
-45.00	118.80	-18.00	72.00	1	0	0	89.96	-29.94
-45.00	118.80	-18.00	42.00	1	0	0	89.96	-30.05
-45.00	66.00	-18.00	42.00	1	0	0	89.78	-30.13
0.0	66.00	-18.00	72.00	0	0	0	-179.91	-30.04
0.0	118.80	-18.00	72.00	0	0	0	-179.91	-29.94
0.0	118.80	-18.00	42.00	0	0	0	-179.91	-30.04
0.0	66.00	-18.00	42.00	0	0	0	-179.91	-30.15
45.00	66.00	-18.00	72.00	0	0	0	-89.66	-29.97
45.00	118.80	-18.00	72.00	0	0	0	-89.83	-29.89
45.00	118.80	-18.00	42.00	0	0	0	-89.83	-30.00

45.00	66.00	-18.00	42.00	0	0	0	-89.66	-30.07
90.00	66.00	-18.00	72.00	0	0	0	-1.60	-29.64
90.00	118.80	-18.00	72.00	0	0	0	-1.85	-29.83
90.00	118.80	-18.00	42.00	0	0	0	-1.85	-29.94
90.00	66.00	-18.00	42.00	0	0	0	-1.60	-29.94
135.00	66.00	-18.00	72.00	0	0	0	90.22	-29.72
135.00	118.80	-18.00	72.00	0	0	0	90.04	-29.80
135.00	118.80	-18.00	42.00	0	0	0	90.04	-29.91
135.00	66.00	-18.00	42.00	0	0	0	90.22	-29.83
180.00	66.00	-18.00	72.00	0	0	0	177.92	-29.70
180.00	118.80	-18.00	72.00	0	0	0	177.92	-29.81
180.00	118.80	-18.00	42.00	0	0	0	177.92	-29.91
180.00	66.00	-18.00	42.00	0	0	0	177.92	-29.80

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 6   IDENTIFICATION: RIGHT AFT PANEL

SUN ELEVATION 30.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

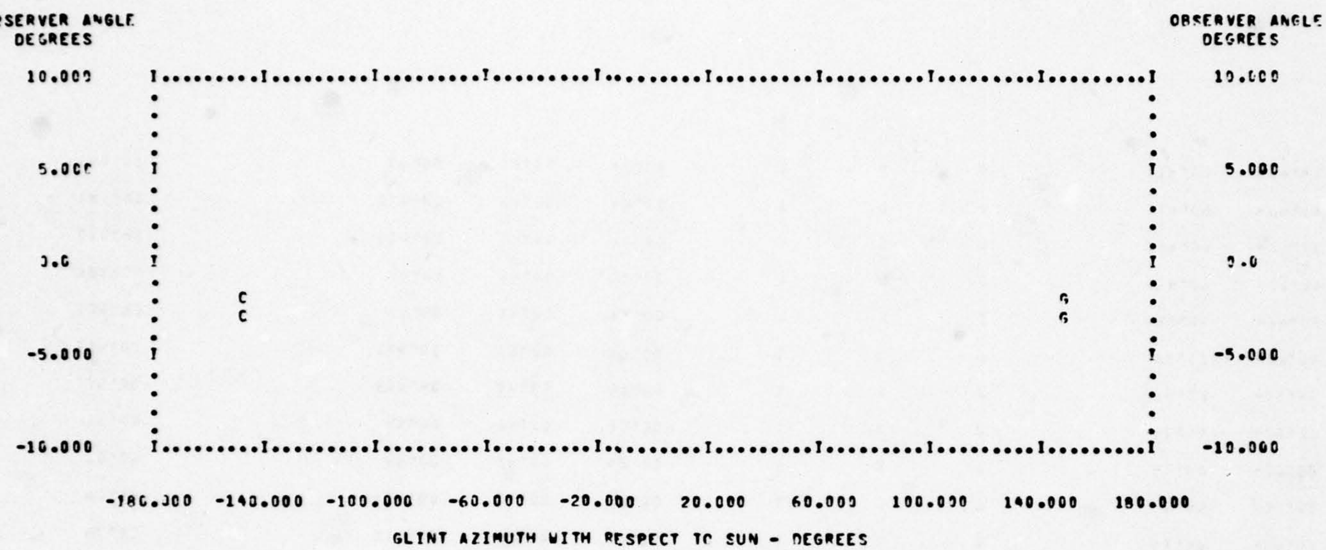
A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE, BUTTLINE, WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTPF	GLINT AZIMUTH	ELEVATION
-180.00	66.00	18.00	72.00	0	0	0	-177.92	-29.70
-180.00	118.80	18.00	72.00	0	0	0	-177.92	-29.81
-180.00	118.80	18.00	42.00	0	0	0	-177.92	-29.91
-180.00	66.00	18.00	42.00	0	0	0	-177.92	-29.80
-135.00	66.00	18.00	72.00	0	0	0	-90.22	-29.72
-135.00	118.80	18.00	72.00	0	0	0	-90.04	-29.80
-135.00	118.80	18.00	42.00	0	0	0	-90.04	-29.91
-135.00	66.00	18.00	42.00	0	0	0	-90.22	-29.83
-90.00	66.00	18.00	72.00	0	0	0	1.60	-29.84
-90.00	118.80	18.00	72.00	0	0	0	1.85	-29.83
-90.00	118.80	18.00	42.00	0	0	0	1.85	-29.94
-90.00	66.00	18.00	42.00	0	0	0	1.60	-29.94
-45.00	66.00	18.00	72.00	0	0	0	89.66	-29.97
-45.00	118.80	18.00	72.00	0	0	0	89.83	-29.89
-45.00	118.80	18.00	42.00	0	0	0	89.83	-30.00
-45.00	66.00	18.00	42.00	0	0	0	89.66	-30.07
0.0	66.00	18.00	72.00	0	0	0	179.91	-30.04
0.0	118.80	18.00	72.00	0	0	0	179.91	-29.94
0.0	118.80	18.00	42.00	0	0	0	179.91	-30.04
0.0	66.00	18.00	42.00	0	0	0	179.91	-30.15
45.00	66.00	18.00	72.00	1	0	0	-89.78	-30.02
45.00	118.80	18.00	72.00	1	0	0	-89.96	-29.94
45.00	118.80	18.00	42.00	1	0	0	-89.96	-30.05

45.00	66.00	18.00	42.00	1	0	0	-89.78	-30.13
90.00	66.00	18.00	72.00	1	0	0	-1.60	-29.91
90.00	118.80	18.00	72.00	1	0	0	-1.85	-29.91
90.00	118.80	18.00	42.00	1	0	0	-1.85	-30.02
90.00	66.00	18.00	42.00	1	0	0	-1.60	-30.02
35.00	66.00	18.00	72.00	1	0	0	90.34	-29.77
135.00	118.80	18.00	72.00	1	0	0	90.17	-29.85
135.00	118.80	18.00	42.00	1	0	0	90.17	-29.96
135.00	66.00	18.00	42.00	1	0	0	90.34	-29.88
180.00	66.00	18.00	72.00	1	0	0	178.09	-29.79
180.00	118.80	18.00	72.00	1	0	0	178.09	-29.81
180.00	118.80	18.00	42.00	1	0	0	178.09	-29.91
180.00	66.00	18.00	42.00	1	0	0	178.09	-29.81

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

SUN GLINT SIGNATURE

SUN ELEVATION 30.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0



PROBABILITY: 0.004

KEY TO PLOT SYMBOLS

SYMBOL	A/C HEADING (DEG)	SYMBOL	A/C HEADING (DEG)
A	-180.00	F	45.00
B	-135.00	G	90.00
C	-90.00	K	135.00
D	-45.00	M	180.00
E	0.0		

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 1   IDENTIFICATION: WINDSHIELD

SUN ELEVATION	60.00	XROT	150.00
A/C PITCH ATTITUDE	0.0	YROT	0.0
A/C ROLL ATTITUDE	0.0	ZROT	36.00
		DISTG	1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INPFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	27.60	-18.00	42.00	0	0	0	-179.71	-37.00
-180.00	54.00	-18.00	72.00	0	0	0	-179.71	-36.97
-180.00	54.00	18.00	72.00	0	0	0	-179.54	-36.97
-180.00	27.60	18.00	42.00	0	0	0	-179.54	-37.00
-135.00	27.60	-18.00	42.00	0	0	0	-158.32	-27.18
-135.00	54.00	-18.00	72.00	0	0	0	-158.37	-27.12
-135.00	54.00	18.00	72.00	0	0	0	-158.21	-27.14
-135.00	27.60	18.00	42.00	0	0	0	-158.16	-27.21
-90.00	27.60	-18.00	42.00	0	0	0	-118.95	-5.74
-90.00	54.00	-18.00	72.00	0	0	0	-119.01	-5.61
-90.00	54.00	18.00	72.00	0	0	0	-118.86	-5.62
-90.00	27.60	18.00	42.00	0	0	0	-118.80	-5.75
-45.00	27.60	-18.00	42.00	0	0	0	-66.23	13.81
-45.00	54.00	-18.00	72.00	0	0	0	-66.27	13.98
-45.00	54.00	18.00	72.00	0	0	0	-66.11	13.99
-45.00	27.60	18.00	42.00	0	0	0	-66.07	13.83
0.0	27.60	-18.00	42.00	0	0	0	-0.09	22.51
0.0	54.00	-18.00	72.00	0	0	0	-0.09	22.68
0.0	54.00	18.00	72.00	0	0	0	0.09	22.68
0.0	27.60	18.00	42.00	0	0	0	0.09	22.51
45.00	27.60	-18.00	42.00	0	0	0	66.07	13.83
45.00	54.00	-18.00	72.00	0	0	0	66.11	13.99
45.00	54.00	18.00	72.00	0	0	0	66.27	13.98

45.00	27.60	18.00	42.00	0	0	0	66.23	13.81
90.00	27.60	-18.00	42.00	0	0	0	118.80	-5.75
90.00	54.00	-18.00	72.00	0	0	0	118.86	-5.62
90.00	54.00	18.00	72.00	0	0	0	119.01	-5.61
90.00	27.60	18.00	42.00	0	0	0	118.95	-5.74
135.00	27.60	-18.00	42.00	0	0	0	158.16	-27.21
135.00	54.00	-18.00	72.00	0	0	0	158.21	-27.14
135.00	54.00	18.00	72.00	0	0	0	158.37	-27.12
135.00	27.60	18.00	42.00	0	0	0	158.32	-27.18
180.00	27.60	-18.00	42.00	0	0	0	179.54	-37.00
180.00	54.00	-18.00	72.00	0	0	0	179.54	-36.97
180.00	54.00	18.00	72.00	0	0	0	179.71	-36.97
180.00	27.60	18.00	42.00	0	0	0	179.71	-37.00

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 2   IDENTIFICATION: TOP PANEL

SUN ELEVATION 60.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	66.00	-18.00	72.00	0	0	0	179.92	59.87
-180.00	118.80	-18.00	72.00	0	0	0	179.92	59.98
-180.00	118.80	18.00	72.00	0	0	0	-179.91	59.98
-180.00	66.00	18.00	72.00	0	0	0	-179.91	59.87
-135.00	66.00	-18.00	72.00	0	0	0	-179.78	59.89
-135.00	118.80	-18.00	72.00	0	0	0	-179.96	59.97
-135.00	118.80	18.00	72.00	0	0	0	-179.83	60.02
-135.00	66.00	18.00	72.00	0	0	0	-179.66	59.95
-90.00	66.00	-18.00	72.00	0	0	0	-179.60	60.01
-90.00	118.80	-18.00	72.00	0	0	0	-179.85	60.01
-90.00	118.80	18.00	72.00	0	0	0	-179.85	60.08
-90.00	66.00	18.00	72.00	0	0	0	-179.60	60.08
-45.00	66.00	-18.00	72.00	0	0	0	-179.66	60.14
-45.00	118.80	-18.00	72.00	0	0	0	-179.83	60.06
-45.00	118.80	18.00	72.00	0	0	0	-179.96	60.11
-45.00	66.00	18.00	72.00	0	0	0	-179.78	60.19
0.0	66.00	-18.00	72.00	0	0	0	-179.91	60.22
0.0	118.80	-18.00	72.00	0	0	0	-179.91	60.11
0.0	118.80	18.00	72.00	0	0	0	179.91	60.11
0.0	66.00	18.00	72.00	0	0	0	179.91	60.22
45.00	66.00	-18.00	72.00	0	0	0	179.78	60.19
45.00	118.80	-18.00	72.00	0	0	0	179.96	60.11
45.00	118.80	18.00	72.00	0	0	0	179.83	60.06

45.00	66.00	18.00	72.00	0	0	0	179.66	60.14
90.00	66.00	-18.00	72.00	0	0	0	179.60	60.08
90.00	118.80	-18.00	72.00	0	0	0	179.85	60.08
90.00	118.80	18.00	72.00	0	0	0	179.85	60.01
90.00	66.00	18.00	72.00	0	0	0	179.60	60.01
135.00	66.00	-18.00	72.00	0	0	0	179.66	59.95
135.00	118.80	-18.00	72.00	0	0	0	179.83	60.02
135.00	118.80	18.00	72.00	0	0	0	179.96	59.97
135.00	66.00	18.00	72.00	0	0	0	179.78	59.89
180.00	66.00	-18.00	72.00	0	0	0	179.91	59.87
180.00	118.80	-18.00	72.00	0	0	0	179.91	59.98
180.00	118.80	18.00	72.00	0	0	0	-179.92	59.98
180.00	66.00	18.00	72.00	0	0	0	-179.92	59.87

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 3   IDENTIFICATION: LEFT FORWARD PANEL

SUN ELEVATION	60.00	XROT	150.00
A/C PITCH ATTITUDE	0.0	YROT	0.0
A/C ROLL ATTITUDE	0.0	ZROT	36.00
		DISTG	1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	27.60	-18.00	42.00	1	0	0	-178.10	-59.74
-180.00	54.00	-18.00	72.00	1	0	0	-178.09	-59.76
-180.00	54.00	-18.00	42.00	1	0	0	-178.09	-59.79
-135.00	27.60	-18.00	42.00	1	0	0	-50.47	-59.84
-135.00	54.00	-18.00	72.00	1	0	0	-90.38	-59.84
-135.00	54.00	-18.00	42.00	1	0	0	-90.38	-59.88
-90.00	27.60	-18.00	42.00	1	0	0	1.42	-60.03
-90.00	54.00	-18.00	72.00	1	0	0	1.54	-60.00
-90.00	54.00	-18.00	42.00	1	1	0	1.54	-60.03
-45.00	27.60	-18.00	42.00	1	0	0	89.65	-60.20
-45.00	54.00	-18.00	72.00	1	0	0	89.74	-60.12
-45.00	54.00	-18.00	42.00	1	0	0	89.74	-60.16
0.0	27.60	-18.00	42.00	0	0	0	-179.91	-60.24
0.0	54.00	-18.00	72.00	0	0	0	-179.91	-60.15
0.0	54.00	-18.00	42.00	0	0	0	-179.91	-60.19
45.00	27.60	-18.00	42.00	0	0	0	-89.53	-60.14
45.00	54.00	-18.00	72.00	0	0	0	-89.62	-60.07
45.00	54.00	-18.00	42.00	0	0	0	-89.62	-60.11
90.00	27.60	-18.00	42.00	0	0	0	-1.41	-59.96
90.00	54.00	-18.00	72.00	0	0	0	-1.54	-59.92
90.00	54.00	-18.00	42.00	0	0	0	-1.54	-59.96
135.00	27.60	-18.00	42.00	0	0	0	90.35	-59.79
135.00	54.00	-18.00	72.00	0	0	0	90.26	-59.79

135.00	54.00	-18.00	42.00	0	0	0	90.26	-59.62
180.00	27.60	-18.00	42.00	0	0	0	177.92	-59.74
180.00	54.00	-18.00	72.00	0	0	0	177.92	-59.76
180.00	54.00	-18.00	42.00	0	0	0	177.92	-59.79

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 4   IDENTIFICATION: RIGHT FORWARD PANEL

SUN ELEVATION 60.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XRCT 150.00
YRCT 0.0
ZRCT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	27.60	18.00	42.00	0	0	0	-177.92	-59.74
-180.00	54.00	18.00	72.00	0	0	0	-177.92	-59.76
-180.00	54.00	18.00	42.00	0	0	0	-177.92	-59.79
-135.00	27.60	18.00	42.00	0	0	0	-90.35	-59.79
-135.00	54.00	18.00	72.00	0	0	0	-90.26	-59.79
-135.00	54.00	18.00	42.00	0	0	0	-90.26	-59.82
-90.00	27.60	18.00	42.00	0	0	0	1.41	-59.96
-90.00	54.00	18.00	72.00	0	0	0	1.54	-59.92
-90.00	54.00	18.00	42.00	0	0	0	1.54	-59.96
-45.00	27.60	18.00	42.00	0	0	0	89.53	-60.14
-45.00	54.00	18.00	72.00	0	0	0	89.62	-60.07
-45.00	54.00	18.00	42.00	0	0	0	89.62	-60.11
0.0	27.60	18.00	42.00	0	0	0	179.91	-60.24
0.0	54.00	18.00	72.00	0	0	0	179.91	-60.15
0.0	54.00	18.00	42.00	0	0	0	179.91	-60.19
45.00	27.60	18.00	42.00	1	0	0	-89.65	-60.20
45.00	54.00	18.00	72.00	1	0	0	-89.74	-60.12
45.00	54.00	18.00	42.00	1	0	0	-89.74	-60.16
90.00	27.60	18.00	42.00	1	0	0	-1.42	-60.03
90.00	54.00	18.00	72.00	1	0	0	-1.54	-60.00
90.00	54.00	18.00	42.00	1	1	0	-1.54	-60.03
135.00	27.60	18.00	42.00	1	0	0	90.47	-59.84
135.00	54.00	18.00	72.00	1	0	0	90.38	-59.84

135.00	54.00	18.00	42.00	1	0	0	90.38	-59.88
180.00	27.60	18.00	42.00	1	0	0	178.10	-59.74
180.00	54.00	18.00	72.00	1	0	0	178.09	-59.76
185.00	54.00	18.00	42.00	1	0	0	178.09	-59.79

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. [illegible]   IDENTIFICATION: LEFT AFT PANEL

SUN ELEVATION 60.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	66.00	-18.00	72.00	1	0	0	-178.09	-59.76
-180.00	118.80	-18.00	72.00	1	0	0	-178.09	-59.89
-180.00	118.80	-18.00	42.00	1	0	0	-178.09	-59.93
-180.00	66.00	-18.00	42.00	1	0	0	-178.09	-59.82
-135.00	66.00	-18.00	72.00	1	0	0	-90.34	-59.86
-135.00	118.80	-18.00	72.00	1	0	0	-90.17	-59.94
-135.00	118.80	-18.00	42.00	1	0	0	-90.17	-59.97
-135.00	66.00	-18.00	42.00	1	0	0	-90.34	-59.90
-90.00	66.00	-18.00	72.00	1	0	0	1.60	-60.00
-90.00	118.80	-18.00	72.00	1	0	0	1.85	-60.00
-90.00	118.80	-18.00	42.00	1	0	0	1.85	-60.03
-90.00	66.00	-18.00	42.00	1	0	0	1.60	-60.03
-45.00	66.00	-18.00	72.00	1	0	0	89.78	-60.11
-45.00	118.80	-18.00	72.00	1	0	0	89.96	-60.03
-45.00	118.80	-18.00	42.00	1	0	0	89.96	-60.06
-45.00	66.00	-18.00	42.00	1	0	0	89.78	-60.14
0.0	66.00	-18.00	72.00	0	0	0	-179.91	-60.13
0.0	118.80	-18.00	72.00	0	0	0	-179.91	-60.02
0.0	118.80	-18.00	42.00	0	0	0	-179.91	-60.06
0.0	66.00	-18.00	42.00	0	0	0	-179.91	-60.17
45.00	66.00	-18.00	72.00	0	0	0	-89.66	-60.05
45.00	118.80	-18.00	72.00	0	0	0	-89.83	-59.98
45.00	118.80	-18.00	42.00	0	0	0	-89.83	-60.01

45.00	66.00	-18.00	42.00	0	0	0	-89.66	-60.09
90.00	66.00	-18.00	72.00	0	0	0	-1.60	-59.92
90.00	118.80	-18.00	72.00	0	0	0	-1.85	-59.92
90.00	118.80	-18.00	42.00	0	0	0	-1.85	-59.96
90.00	66.00	-18.00	42.00	0	0	0	-1.60	-59.96
135.00	66.00	-18.00	72.00	0	0	0	90.22	-59.81
135.00	118.80	-18.00	72.00	0	0	0	90.04	-59.88
135.00	118.80	-18.00	42.00	0	0	0	90.04	-59.92
135.00	66.00	-18.00	42.00	0	0	0	90.22	-59.84
180.00	66.00	-18.00	72.00	0	0	0	177.92	-59.78
180.00	118.80	-18.00	72.00	0	0	0	177.92	-59.89
180.00	118.80	-18.00	42.00	0	0	0	177.92	-59.93
180.00	66.00	-18.00	42.00	0	0	0	177.92	-59.82

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 6   IDENTIFICATION: RIGHT AFT PANEL

SUN ELEVATION 60.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 150.00
YROT 0.0
ZROT 36.00
DISTG 1000.00

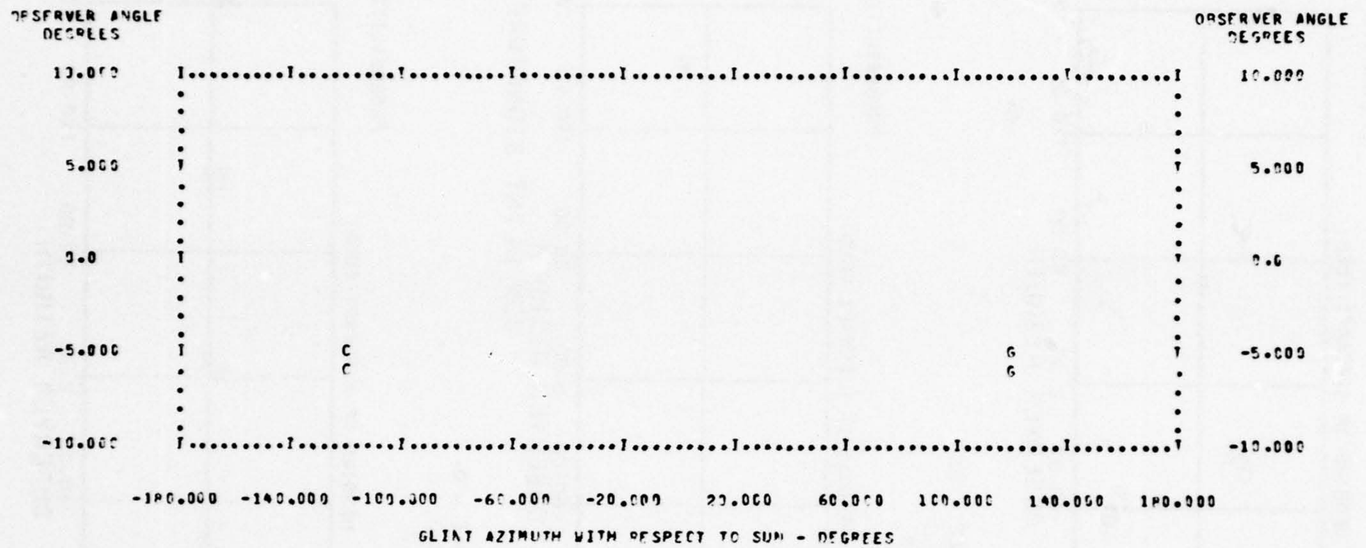
A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-180.00	66.00	18.00	72.00	0	0	0	-177.92	-59.78
-180.00	118.80	18.00	72.00	0	0	0	-177.92	-59.89
-180.00	118.80	18.00	42.00	0	0	0	-177.92	-59.93
-180.00	66.00	18.00	42.00	0	0	0	-177.92	-59.82
-135.00	66.00	18.00	72.00	0	0	0	-90.22	-59.81
-135.00	118.80	18.00	72.00	0	0	0	-90.04	-59.88
-135.00	118.80	18.00	42.00	0	0	0	-90.04	-59.92
-135.00	66.00	18.00	42.00	0	0	0	-90.22	-59.84
-90.00	66.00	18.00	72.00	0	0	0	1.60	-59.92
-90.00	118.80	18.00	72.00	0	0	0	1.85	-59.92
-90.00	118.80	18.00	42.00	0	0	0	1.85	-59.96
-90.00	66.00	18.00	42.00	0	0	0	1.60	-59.96
-45.00	66.00	18.00	72.00	0	0	0	89.66	-60.05
-45.00	118.80	18.00	72.00	0	0	0	89.83	-59.98
-45.00	118.80	18.00	42.00	0	0	0	89.83	-60.01
-45.00	66.00	18.00	42.00	0	0	0	89.66	-60.09
0.0	66.00	18.00	72.00	0	0	0	179.91	-60.13
0.0	118.80	18.00	72.00	0	0	0	179.91	-60.02
0.0	118.80	18.00	42.00	0	0	0	179.91	-60.06
0.0	66.00	18.00	42.00	0	0	0	179.91	-60.17
45.00	66.00	18.00	72.00	1	0	0	-89.78	-60.11
45.00	118.80	18.00	72.00	1	0	0	-89.96	-60.03
45.00	118.80	18.00	42.00	1	0	0	-89.96	-60.06

45.00	66.00	18.00	42.00	1	0	0	-59.78	-60.14
90.00	66.00	18.00	72.00	1	0	0	-1.60	-60.00
90.00	118.80	18.00	72.00	1	0	0	-1.85	-60.00
90.00	118.80	18.00	42.00	1	0	0	-1.85	-60.03
90.00	66.00	18.00	42.00	1	0	0	-1.60	-60.03
135.00	66.00	18.00	72.00	1	0	0	90.34	-59.86
135.00	118.80	18.00	72.00	1	0	0	90.17	-59.94
135.00	118.80	18.00	42.00	1	0	0	90.17	-59.97
135.00	66.00	18.00	42.00	1	0	0	90.34	-59.90
180.00	66.00	18.00	72.00	1	0	0	178.09	-59.78
180.00	118.80	18.00	72.00	1	0	0	178.09	-59.89
180.00	118.80	18.00	42.00	1	0	0	178.09	-59.93
180.00	66.00	18.00	42.00	1	0	0	178.09	-59.82

FLAT SURFACES WITH FENCES   SAMPLE CASE ONE

SUN GLINT SIGNATURE

SUN ELEVATION 60.00
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

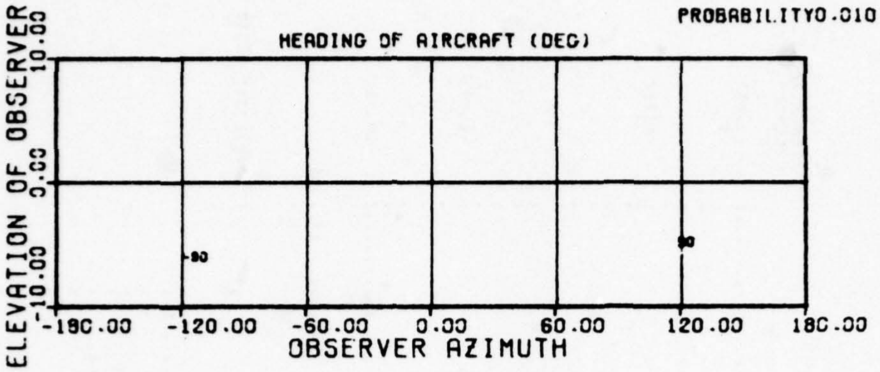


PROBABILITY: 0.010

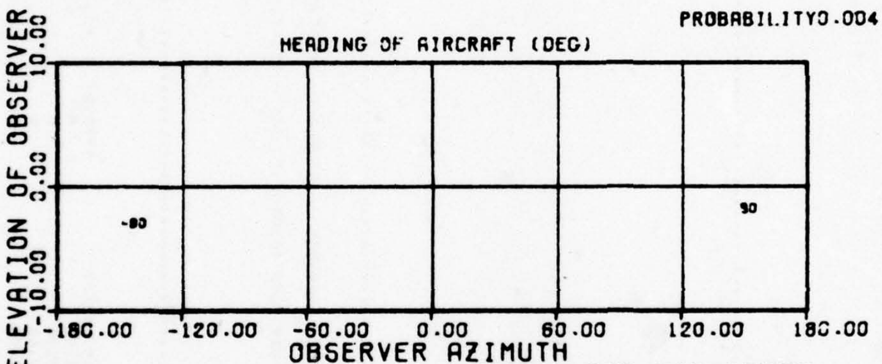
KEY TO PLOT SYMBOLS

SYMBOL	A/C HEADING (DEG)	SYMBOL	A/C HEADING (DEG)
A	-180.00	F	45.00
B	-135.00	G	90.00
C	-90.00	K	135.00
D	-45.00	M	180.00
E	0.0		

SUN ELEVATION ANGLE = 60.
A/C PITCH ATT = 0.0
A/C ROLL ATT = 0.0

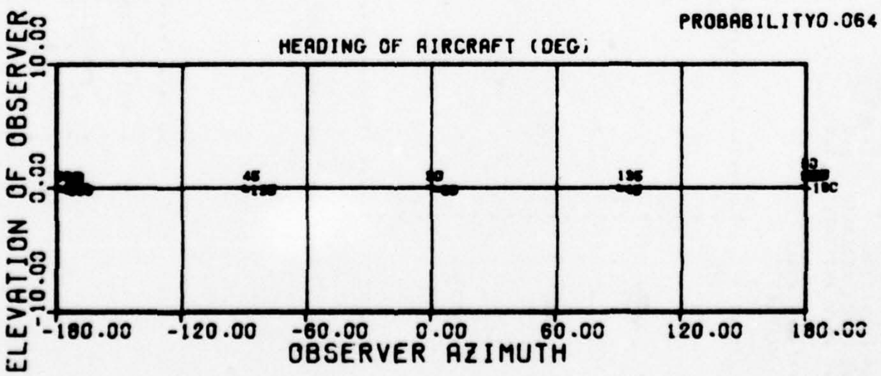


SUN ELEVATION ANGLE = 30.
A/C PITCH ATT = 0.0
A/C ROLL ATT = 0.0



SUN GLINT SIGNATURE

SUN ELEVATION ANGLE = 0.
A/C PITCH ATT = 0.0
A/C ROLL ATT = 0.0



The second case represents a configuration with curved surfaces, shown in Figure A-3. The tabulation of points is shown in Table A-2. Some of the output data has been suppressed by setting PLOT = 2., no CALCOMP plots. Also, only one sun elevation, zero degrees, was chosen by setting GAMN = 1. and GAMI = 0. And since the glints from the windshield alone will vary from -180 to 180 degrees in azimuth at an aircraft heading of zero, only two headings were chosen to avoid much overlapping. The headings chosen were -45 and 45 degrees, by setting PSIN = 2., PSII = -45., and DPSI = 90. The card images for this case are shown in Figure A-4. The default option was not chosen for this case, in order to demonstrate the additional inputs required. These additional inputs, which specify which terms to use in the curve-fit analysis, come after the symmetry card for each reflective surface input except those that are symmetrical to the preceding surface. Additional engineering judgment must be exercised when using this option. For instance, the first and second surfaces appear to be a function of x, z, x^2, y^2, and z^2. Therefore, a value of one is placed on the data cards corresponding to these inputs. The side panels seem to be independent of x and x^2. Therefore, a value of one is placed on the data cards corresponding to z, y^2, and z^2 locations only. The results from the inputs of Figure A-4 are shown on pages 123 through 138. It was found using these terms that the error for the curve-fit of the windshield was substantially higher than that for the other surfaces. This brings up a point. By inspecting the results of the curve-fit analysis, the program user can decide if one or more of the surfaces needs to be broken up into smaller pieces. A closer look at Figure A-3 reveals that part of the windshield actually looks like a side panel, thus independent of x and x^2. If an imaginary line is drawn on the windshield connecting points KK DD D, two surfaces are formed. Surface number one, which will be identified as WINDSHIELD FORWARD SECTION LEFT SIDE, will be formed from points D E F G H K KK DD. The second surface, WINDSHIELD AFT SECTION LEFT SIDE, will be formed from points A B C D DD KK. The modified inputs for case II with this decomposition of the windshield are shown in Figure A-5. The curve-fit result for the windshield as shown on page 145 is greatly improved; the complete results are on pages 139 through 158.

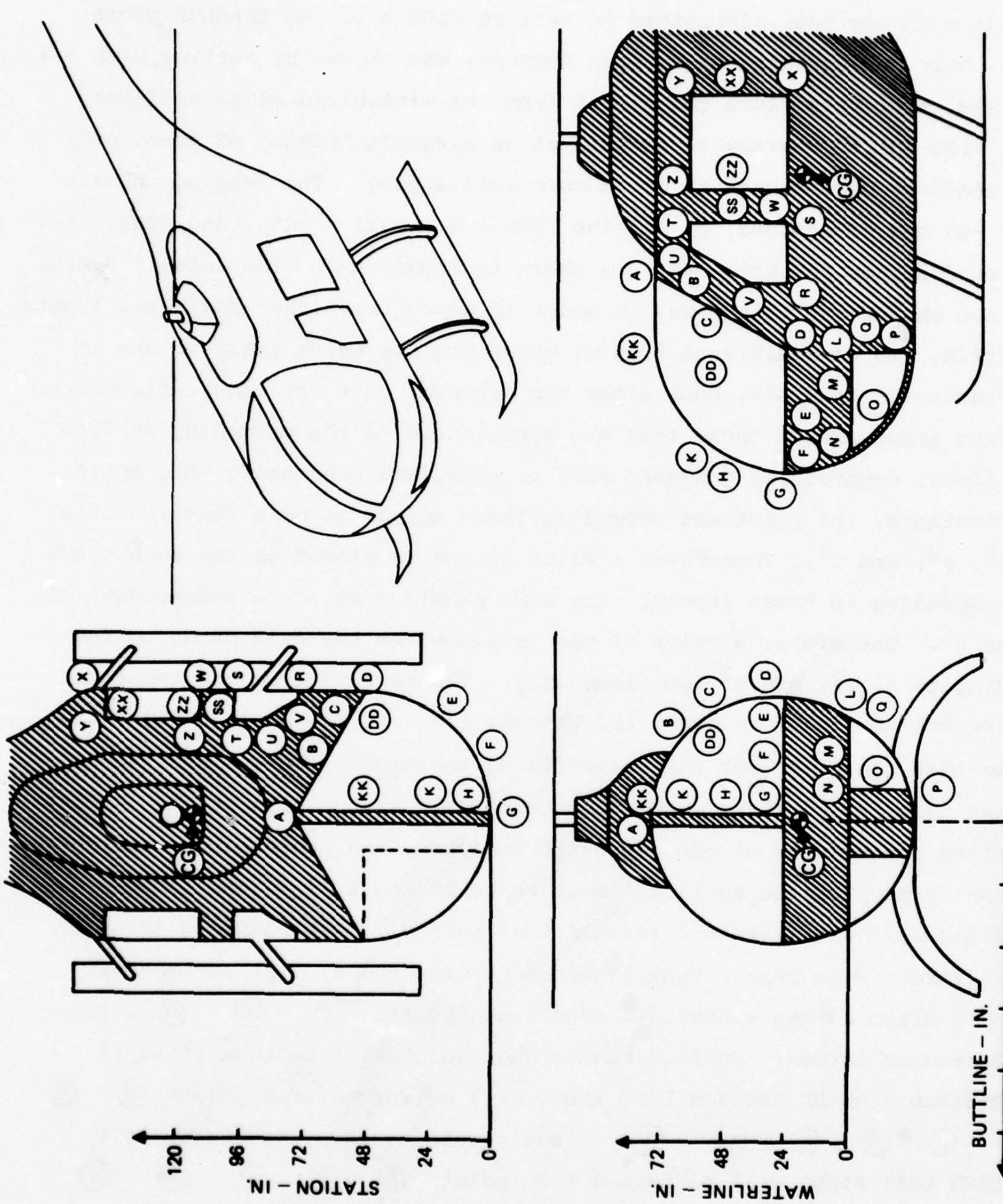


Figure A–3. Case II Configuration.

TABLE A-2. COORDINATES OF CASE II HELICOPTER CONFIGURATION

Coordinates of Center of Rotation (CG)

Station	Buttline	Waterline
114.	0	18.

Coordinates of Windshield Boundary Points

	Station	Buttline	Waterline
A	72.	0	72.
B	66.	-33.75	60.
C	60.	-41.57	48.
D	48.	-48.	24.
E	16.25	-36.	24.
F	6.43	-24.	24.
G	0	0	24.
H	6.43	0	48.
K	16.25	0	60.
KK	48.	0	72.
DD	48.	-37.47	54.

Coordinates of Lower Panel (Left Side) Boundary Points

	Station	Buttline	Waterline
L	48.	-41.57	0
M	30.	-37.47	0
N	8.2	-12.	0
O	18.6	-12.	-12.
P	48.	-12.	-22.48
Q	48.	-37.47	- 6.

Coordinates of Forward Side Panel (Left Side) Boundary Points

	Station	Buttline	Waterline
R	72	-48.	24.
S	96.	-48.	24.
SS	96.	-44.5	42.
T	96.	-31.75	60.
U	84.	-31.75	60.
V	72.	-46.48	36.

TABLE A-2 - Continued

Coordinates of Aft Side Panel (Left Side) Boundary Points

	Station	Buttline	Waterline
W	108.	-48.	24.
X	144.	-48.	24.
XX	144.	-44.5	42.
Y	144.	-31.75	60.
Z	108.	-31.75	60.
ZZ	108.	-44.5	42.

```
 CURVED PANELS WITH NO FENCES  SAMPLE CASE TWO
0.       2.       0.       0.
1.       0.       0.       2.       -45.     90.
114.     0.       18.
1500.
0.       8.       2.       1.
 LEFT SIDE OF WINDSHIELD
0.
1.       0.       1.       0.       0.       0.     ADDITIONAL
1.       1.       1.                                INPUTS
0.       0.       0.       0.       0.       0.     WHEN
0.       0.       0.       0.                       DEFLT = 0
11.
72.      0.       72.      66.      -31.75   60.
60.      -41.57   48.      48.      -48.     24.
16.25    -36.     24.      6.43     -24.     24.
0.       0.       24.      6.43     0.       48.
16.25    0.       60.      48.      0.       72.
48.      -37.47   54.
 RIGHT SIDE OF WINSHIELD
1.
 LOWER FRONT PANEL LEFT SIDE
0.
1.       0.       1.       0.       0.       0.     ADDITIONAL
1.       1.       1.                                INPUTS
0.       0.       0.       0.       0.       0.     WHEN
0.       0.       0.       0.                       DEFLT = 0
6.
48.      -41.57   0.       30.      -37.47   0.
8.2      -12.     0.       18.6     -12.     -12.
48.      -12.     -22.48   48.      -37.47   -6.
 LOWER FRONT PANEL RIGHT SIDE
1.
 FORWARD SIDE PANEL LEFT SIDE
0.
0.       0.       1.       0.       0.       0.     ADDITIONAL
0.       1.       1.                                INPUTS
0.       0.       0.       0.       0.       0.     WHEN
0.       0.       0.       0.                       DEFLT = 0
6.
72.      -48.     24.      96.      -48.     24.
96.      -44.5    42.      96.      -31.75   60.
84.      -31.75   60.      72.      -46.48   36.
 FORWARD SIDE PANEL RIGHT SIDE
1.
AFT SIDE PANEL LEFT SIDE
0.
0.       0.       1.       0.       0.       0.     ADDITIONAL
0.       1.       1.                                INPUTS
0.       0.       0.       0.       0.       0.     WHEN
0.       0.       0.       0.                       DEFLT = 0
6.
108.     -48.     24.      144.     -48.     24.
144.     -44.5    42.      144.     -31.75   60.
108.     -31.75   60.      108.     -44.5    42.
AFT SIDE PANEL RIGHT SIDE
1.
```

Figure A–4. Input for Case II; Card Images.

```
 CURVED PANELS WITH NO FENCES  SAMPLE CASE TWO
 - MODIFIED WINDSHIELD
0.         2.        0.         0.
1.         0.        0.         2.        -45.       90.
114.       0.        18.
1500.      -10.      10.        -180.     180.
0.         10.       2.         1.
  WINDSHIELD FORWARD SECTION LEFT SIDE
0.
1.         0.        1.         0.        0.         0.
1.         1.        1.
0.         0.        0.         0.        0.         0.
0.         0.        0.         0.
8.
48.        -48.      24.        16.25     -36.       24.
6.43       -24.      24.        0.        0.         24.
6.43       0.        48.        16.25     0.         60.
48.        0.        72.        48.       -37.47     54.
  WINDSHIELD FORWARD SECTION RIGHT SIDE
1.
 WINDSHIELD AFT SECTION LEFT SIDE
0.
0.         0.        1.         0.        0.         0.
0.         1.        1.
0.         0.        0.         0.        0.         0.
0.         0.        0.         0.
6.
72.        0.        72.        66.       -31.75     60.
60.        -41.57    48.        48.       -48.       24.
48.        -37.47    54.        48.       0.         72.
  WINDSHIELD AFT SECTION RIGHT SIDE
1.
  LOWER FRONT PANEL LEFT SIDE
0.
1.         0.        1.         0.        0.         0.
1.         1.        1.
0.         0.        0.         0.        0.         0.
0.         0.        0.         0.
6.
48.        -41.57    0.         30.       -37.47     0.
8.2        -12.      0.         18.6      -12.       -12.
48.        -12.      -22.48     48.       -37.47     -6.
  LOWER FRONT PANEL RIGHT SIDE
1.
```

Figure A–5. Input for Case II (Windshield Modified); Card Images (Sheet 1 of 2).

```
 FORWARD SIDE PANEL LEFT SIDE
[illegible]
0.          0.          1.          0.          0.          0.
0.          1.          1.
0.          0.          0.          0.          0.          0.
0.          0.          0.          0.
6.
72.         -48.        24.         96.         -48.        24.
96.         -44.5       42.         96.         -31.75      60.
84.         -31.75      60.         72.         -46.48      36.
 FORWARD SIDE PANEL RIGHT SIDE
1.
AFT SIDE PANEL LEFT SIDE
0.
0.          0.          1.          0.          0.          0.
0.          1.          1.
0.          0.          0.          0.          0.          0.
0.          0.          0.          0.
6.
108.        -48.        24.         144.        -48.        24.
144.        -44.5       42.         144.        -31.75      60.
108.        -31.75      60.         108.        -44.5       42.
AFT SIDE PANEL RIGHT SIDE
1.
```

Figure A–5. Input for Case II (Windshield Modified); Card Images (Sheet 2 of 2).

```
CURVED PANELS WITH NO FENCES    SAMPLE CASE TWO

                                                  *** INPUT DATA ***

  **CONTROL OPTIONS
      DEFAULT OPTION         0.          PRINT OPTION           2.
      PLOT OPTION            2.          PROBABILITY OPT        1.

  **AIRCRAFT INITIAL EULER ORIENTATION
      PITCH                  0.0         ROLL                   0.0        YAW                      -45.0

  **SELECTED YAW ANGLE ROTATIONS
      NO. OF ANGLES          2.          INITIAL ANGLE        -45.0        ANGLE INCREMENT           90.0

  **SELECTED SUN ELEVATIONS
      NO. OF ANGLES          1.          INITIAL ANGLE          0.0        ANGLE INCREMENT            0.0

  **REFERENCE INFORMATION FOR MEASURING SUN GLINT ANGLES
      REFERENCE POINT FOR MEASURING ANGLES OF GLINT SIGNATURE      DISTANCE AT WHICH GLINT SIGNATURE FORMED (FT.)  1500.000
                  X             Y             Z
               114.00          0.0         18.00

  **PLOT SCALING
      GLINT AZIMUTH                      GLINT ELEVATION
         MINIMUM        -180.0              MINIMUM         -10.0
         MAXIMUM         180.0              MAXIMUM          10.0

  **BOUNDARIES FOR CALCULATING PROBABILITY
      GLINT AZIMUTH                      GLINT ELEVATION
         MINIMUM        -180.0              MINIMUM         -10.0
         MAXIMUM         180.0              MAXIMUM          10.0
```

```
CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                        *** INPUT DATA ***

 **REFLECTIVE SURFACE DATA
   NO. OF SURFACES        8.

   *REFLECTIVE SURFACE NO.  1    IDENTIFICATION: LEFT SIDE OF WINDSHIELD

     CURVE-FIT INPUT DATA
       DESIRED TERMS FOR CURVE-FITTING
         (1) X   TERM   1.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
         (6) YZ  TERM   0.     (7) XSQ TERM   1.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

       INPUT VALUES FOR COEFFICIENTS OF SURFACE
         (1) X   COEF   0.0             (2) Y   COEF   0.0             (3) Z   COEF   0.0
         (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
         (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
        (10) CONSTANT   0.0

     BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                X          Y          Z                 X          Y          Z                 X          Y          Z
     ( 1)     72.00       0.0       72.00     ( 2)    66.00     -31.75      60.00     ( 3)    60.00     -41.57      48.00
     ( 4)     48.00     -48.00      24.00     ( 5)    16.25     -36.00      24.00     ( 6)     6.43     -24.00      24.00
     ( 7)      0.0        0.0       24.00     ( 8)     6.43       0.0       48.00     ( 9)    16.25       0.0       60.00
     (10)     48.00       0.0       72.00     (11)    48.00     -37.47      54.00

   *REFLECTIVE SURFACE NO.  2    IDENTIFICATION: RIGHT SIDE OF WINSHIELD

     CURVE-FIT INPUT DATA
       DESIRED TERMS FOR CURVE-FITTING
         (1) X   TERM   1.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
         (6) YZ  TERM   0.     (7) XSQ TERM   1.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

       INPUT VALUES FOR COEFFICIENTS OF SURFACE
         (1) X   COEF   0.0             (2) Y   COEF   0.0             (3) Z   COEF   0.0
         (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
         (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
        (10) CONSTANT   0.0

     BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                X          Y          Z                 X          Y          Z                 X          Y          Z
     ( 1)     72.00       0.0       72.00     ( 2)    66.00      31.75      60.00     ( 3)    60.00      41.57      48.00
     ( 4)     48.00      48.00      24.00     ( 5)    16.25      36.00      24.00     ( 6)     6.43      24.00      24.00
     ( 7)      0.0        0.0       24.00     ( 8)     6.43       0.0       48.00     ( 9)    16.25       0.0       60.00
     (10)     48.00       0.0       72.00     (11)    48.00      37.47      54.00
```

```
CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                   *** INPUT DATA ***

 *REFLECTIVE SURFACE NO.  3     IDENTIFICATION: LOWER FRONT PANEL LEFT SIDE

   CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
       (1) X    TERM   1.     (2) Y    TERM   0.     (3) Z    TERM   1.     (4) XY   TERM   0.     (5) XZ  TERM   0.
       (6) YZ   TERM   0.     (7) XSQ TERM   1.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

     INPUT VALUES FOR COEFFICIENTS OF SURFACE
       (1) X    COEF   0.0             (2) Y    COEF   0.0             (3) Z    COEF   0.0
       (4) XY   COEF   0.0             (5) XZ   COEF   0.0             (6) YZ   COEF   0.0
       (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
      (10) CONSTANT   0.0

   BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
             X          Y          Z                  X          Y          Z                  X          Y          Z
   ( 1)    48.00     -41.57      0.0         ( 2)   30.00     -37.47      0.0         ( 3)    8.20     -12.00      0.0
   ( 4)    18.60     -12.00    -12.00        ( 5)   48.00     -12.00    -22.48        ( 6)   48.00     -37.47     -6.00

 *REFLECTIVE SURFACE NO.  4     IDENTIFICATION: LOWER FRONT PANEL RIGHT SIDE

   CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
       (1) X    TERM   1.     (2) Y    TERM   0.     (3) Z    TERM   1.     (4) XY   TERM   0.     (5) XZ  TERM   0.
       (6) YZ   TERM   0.     (7) XSQ TERM   1.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

     INPUT VALUES FOR COEFFICIENTS OF SURFACE
       (1) X    COEF   0.0             (2) Y    COEF   0.0             (3) Z    COEF   0.0
       (4) XY   COEF   0.0             (5) XZ   COEF   0.0             (6) YZ   COEF   0.0
       (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
      (10) CONSTANT   0.0

   BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
             X          Y          Z                  X          Y          Z                  X          Y          Z
   ( 1)    48.00      41.57      0.0         ( 2)   30.00      37.47      0.0         ( 3)    8.20      12.00      0.0
   ( 4)    18.60      12.00    -12.00        ( 5)   48.00      12.00    -22.48        ( 6)   48.00      37.47     -6.00

 *REFLECTIVE SURFACE NO.  5     IDENTIFICATION: FORWARD SIDE PANEL LEFT SIDE

   CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
       (1) X    TERM   0.     (2) Y    TERM   0.     (3) Z    TERM   1.     (4) XY   TERM   0.     (5) XZ  TERM   0.
       (6) YZ   TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.
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CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                             *** INPUT DATA ***

   *REFLECTIVE SURFACE NO. 5     IDENTIFICATION: FORWARD SIDE PANEL LEFT SIDE

      INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF   0.0          (2) Y   COEF   0.0          (3) Z   COEF   0.0
        (4) XY  COEF   0.0          (5) XZ  COEF   0.0          (6) YZ  COEF   0.0
        (7) XSQ COEF   0.0          (8) YSQ COEF   0.0          (9) ZSQ COEF   0.0
       (10) CONSTANT   0.0

     BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                X         Y         Z                 X         Y         Z                 X         Y         Z
      ( 1)    72.00    -48.00     24.00      ( 2)   96.00    -48.00     24.00      ( 3)   96.00    -44.50     42.00
      ( 4)    96.00    -31.75     60.00      ( 5)   84.00    -31.75     60.00      ( 6)   72.00    -46.48     36.00

   *REFLECTIVE SURFACE NO. 6     IDENTIFICATION: FORWARD SIDE PANEL RIGHT SIDE

     CURVE-FIT INPUT DATA
       DESIRED TERMS FOR CURVE-FITTING
        (1) X   TERM   0.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
        (6) YZ  TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

      INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF   0.0          (2) Y   COEF   0.0          (3) Z   COEF   0.0
        (4) XY  COEF   0.0          (5) XZ  COEF   0.0          (6) YZ  COEF   0.0
        (7) XSQ COEF   0.0          (8) YSQ COEF   0.0          (9) ZSQ COEF   0.0
       (10) CONSTANT   0.0

     BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                X         Y         Z                 X         Y         Z                 X         Y         Z
      ( 1)    72.00     48.00     24.00      ( 2)   96.00     48.00     24.00      ( 3)   96.00     44.50     42.00
      ( 4)    96.00     31.75     60.00      ( 5)   84.00.    31.75     60.00      ( 6)   72.00     46.48     36.00

   *REFLECTIVE SURFACE NO. 7     IDENTIFICATION: AFT SIDE PANEL LEFT SIDE

     CURVE-FIT INPUT DATA
       DESIRED TERMS FOR CURVE-FITTING
        (1) X   TERM   0.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
        (6) YZ  TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

      INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF   0.0          (2) Y   COEF   0.0          (3) Z   COEF   0.0
        (4) XY  COEF   0.0          (5) XZ  COEF   0.0          (6) YZ  COEF   0.0
        (7) XSQ COEF   0.0          (8) YSQ COEF   0.0          (9) ZSQ COEF   0.0
       (10) CONSTANT   0.0
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CURVED PANELS WITH NO FENCES    SAMPLE CASE TWO

                                        *** INPUT DATA ***

   *REFLECTIVE SURFACE NO. 7     IDENTIFICATION: AFT SIDE PANEL LEFT SIDE

    BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
              X          Y          Z                  X          Y          Z                  X          Y          Z
     ( 1)   108.00     -48.00      24.00      ( 2)   144.00     -48.00      24.00      ( 3)   144.00     -44.50      42.00
     ( 4)   144.00     -31.75      60.00      ( 5)   108.00     -31.75      60.00      ( 6)   108.00     -44.50      42.00

   *REFLECTIVE SURFACE NO. 8     IDENTIFICATION: AFT SIDE PANEL RIGHT SIDE

    CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
       (1) X   TERM   0.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
       (6) YZ  TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

     INPUT VALUES FOR COEFFICIENTS OF SURFACE
       (1) X   COEF    0.0             (2) Y   COEF    0.0             (3) Z   COEF    0.0
       (4) XY  COEF    0.0             (5) XZ  COEF    0.0             (6) YZ  COEF    0.0
       (7) XSQ COEF    0.0             (8) YSQ COEF    0.0             (9) ZSQ COEF    0.0
      (10) CONSTANT    0.0

    BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
              X          Y          Z                  X          Y          Z                  X          Y          Z
     ( 1)   108.00      48.00      24.00      ( 2)   144.00      48.00      24.00      ( 3)   144.00      44.50      42.00
     ( 4)   144.00      31.75      60.00      ( 5)   108.00      31.75      60.00      ( 6)   108.00      44.50      42.00
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CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                        *** RESULTS OF CURVE-FIT ANALYSIS ***

 **REFLECTIVE SURFACE DATA

   *REFLECTIVE SURFACE NO.  1      IDENTIFICATION: LEFT SIDE OF WINDSHIELD

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.4071E-01      (2) Y   COEF   0.0               (3) Z   COEF  -0.2472E-02
        (4) XY  COEF    0.0             (5) XZ  COEF   0.0               (6) YZ  COEF   0.0
        (7) XSQ COEF    0.2859E-03      (8) YSQ COEF   0.1883E-03        (9) ZSQ COEF   0.1596E-03
       (10) CONSTANT    0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.6609E-01

   *REFLECTIVE SURFACE NO.  2      IDENTIFICATION: RIGHT SIDE OF WINSHIELD

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.4071E-01      (2) Y   COEF   0.0               (3) Z   COEF  -0.2472E-02
        (4) XY  COEF    0.0             (5) XZ  COEF   0.0               (6) YZ  COEF   0.0
        (7) XSQ COEF    0.2859E-03      (8) YSQ COEF   0.1883E-03        (9) ZSQ COEF   0.1596E-03
       (10) CONSTANT    0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.6609E-01

   *REFLECTIVE SURFACE NO.  3      IDENTIFICATION: LOWER FRONT PANEL LEFT SIDE

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.6319E-01      (2) Y   COEF   0.0               (3) Z   COEF  -0.5735E-02
        (4) XY  COEF    0.0             (5) XZ  COEF   0.0               (6) YZ  COEF   0.0
        (7) XSQ COEF    0.4787E-03      (8) YSQ COEF   0.4786E-03        (9) ZSQ COEF   0.4786E-03
       (10) CONSTANT    0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.2958E-04

   *REFLECTIVE SURFACE NO.  4      IDENTIFICATION: LOWER FRONT PANEL RIGHT SIDE

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.6319E-01      (2) Y   COEF   0.0               (3) Z   COEF  -0.5735E-02
        (4) XY  COEF    0.0             (5) XZ  COEF   0.0               (6) YZ  COEF   0.0
        (7) XSQ COEF    0.4787E-03      (8) YSQ COEF   0.4786E-03        (9) ZSQ COEF   0.4786E-03
       (10) CONSTANT    0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.2958E-04
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CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                        *** RESULTS OF CURVE-FIT ANALYSIS ***

 **REFLECTIVE SURFACE DATA

   *REFLECTIVE SURFACE NO. 5     IDENTIFICATION: FORWARD SIDE PANEL LEFT SIDE

     VALUES FOR COEFFICIENTS OF SURFACE
      (1) X   COEF   0.0           (2) Y   COEF   0.0            (3) Z   COEF  -0.5312E-02
      (4) XY  COEF   0.0           (5) XZ  COEF   0.0            (6) YZ  COEF   0.0
      (7) XSQ COEF   0.0           (8) YSQ COEF   0.4410E-03     (9) ZSQ COEF   0.4414E-03
     (10) CONSTANT  -0.1000E 01

     ROOT MEAN SQUARE ERROR OF FIT=  0.2322E-04

   *REFLECTIVE SURFACE NO. 6     IDENTIFICATION: FORWARD SIDE PANEL RIGHT SIDE

     VALUES FOR COEFFICIENTS OF SURFACE
      (1) X   COEF   0.0           (2) Y   COEF   0.0            (3) Z   COEF  -0.5312E-02
      (4) XY  COEF   0.0           (5) XZ  COEF   0.0            (6) YZ  COEF   0.0
      (7) XSQ COEF   0.0           (8) YSQ COEF   0.4410E-03     (9) ZSQ COEF   0.4414E-03
     (10) CONSTANT  -0.1000E 01

     ROOT MEAN SQUARE ERROR OF FIT=  0.2322E-04

   *REFLECTIVE SURFACE NO. 7     IDENTIFICATION: AFT SIDE PANEL LEFT SIDE

     VALUES FOR COEFFICIENTS OF SURFACE
      (1) X   COEF   0.0           (2) Y   COEF   0.0            (3) Z   COEF  -0.5307E-02
      (4) XY  COEF   0.0           (5) XZ  COEF   0.0            (6) YZ  COEF   0.0
      (7) XSQ COEF   0.0           (8) YSQ COEF   0.4410E-03     (9) ZSQ COEF   0.4413E-03
     (10) CONSTANT  -0.1000E 01

     ROOT MEAN SQUARE ERROR OF FIT=  0.4186E-15

   *REFLECTIVE SURFACE NO. 8     IDENTIFICATION: AFT SIDE PANEL RIGHT SIDE

     VALUES FOR COEFFICIENTS OF SURFACE
      (1) X   COEF   0.0           (2) Y   COEF   0.0            (3) Z   COEF  -0.5307E-02
      (4) XY  COEF   0.0           (5) XZ  COEF   0.0            (6) YZ  COEF   0.0
      (7) XSQ COEF   0.0           (8) YSQ COEF   0.4410E-03     (9) ZSQ COEF   0.4413E-03
     (10) CONSTANT  -0.1000E 01

     ROOT MEAN SQUARE ERROR OF FIT=  0.4186E-15
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CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 1   IDENTIFICATION: LEFT SIDE OF WINDSHIELD

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	72.00	0.0	72.00	1	0	0	-127.88	-44.47
-45.00	66.00	-31.75	60.00	1	0	0	-9.67	-62.74
-45.00	60.00	-41.57	48.00	1	0	0	29.73	-40.74
-45.00	48.00	-48.00	24.00	1	0	0	71.22	2.86
-45.00	16.25	-36.00	24.00	0	0	0	-173.25	-0.16
-45.00	6.43	-24.00	24.00	0	0	0	-136.68	-1.01
-45.00	0.0	0.0	24.00	0	0	0	-89.77	-1.82
-45.00	6.43	0.0	48.00	0	0	0	-36.39	25.64
-45.00	16.25	0.0	60.00	0	0	0	-117.14	42.19
-45.00	48.00	0.0	72.00	1	0	0	-177.52	-15.79
-45.00	48.00	-37.47	54.00	1	0	0	89.12	-48.95
45.00	72.00	0.0	72.00	1	0	0	127.88	-44.47
45.00	66.00	-31.75	60.00	1	0	0	175.62	-2.53
45.00	60.00	-41.57	48.00	0	0	0	-157.47	8.69
45.00	48.00	-48.00	24.00	0	0	0	-188.53	-2.01
45.00	16.25	-36.00	24.00	0	0	0	6.55	-3.09
45.00	6.43	-24.00	24.00	0	0	0	42.96	-2.58
45.00	0.0	0.0	24.00	0	0	0	89.77	-1.82
45.00	6.43	0.0	48.00	0	0	0	96.39	25.64
45.00	16.25	0.0	60.00	0	0	0	117.14	42.15
45.00	48.00	0.0	72.00	1	0	0	177.52	-15.79
45.00	48.00	-37.47	54.00	0	0	0	-130.87	29.57

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 2   IDENTIFICATION: RIGHT SIDE OF WINSHIELD

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	72.00	0.0	72.00	1	0	0	-127.88	-44.47
-45.00	66.00	31.75	60.00	1	0	0	-175.62	-2.53
-45.00	60.00	41.57	48.00	0	0	0	157.47	8.69
-45.00	48.00	48.00	24.00	0	0	0	108.53	-2.01
-45.00	16.25	36.00	24.00	0	0	0	-6.55	-3.09
-45.00	6.43	24.00	24.00	0	0	0	-42.96	-2.58
-45.00	0.0	0.0	24.00	0	0	0	-89.77	-1.82
-45.00	6.43	0.0	48.00	0	0	0	-96.39	25.64
-45.00	16.25	0.0	60.00	0	0	0	-117.14	42.15
-45.00	48.00	0.0	72.00	1	0	0	-177.52	-15.79
-45.00	48.00	37.47	54.00	0	0	0	130.87	29.57
45.00	72.00	0.0	72.00	1	0	0	127.88	-44.47
45.00	66.00	31.75	60.00	1	0	0	9.67	-62.74
45.00	60.00	41.57	48.00	1	0	0	-29.73	-40.74
45.00	48.00	48.00	24.00	1	0	0	-71.22	2.86
45.00	16.25	36.00	24.00	0	0	0	173.25	-0.16
45.00	6.43	24.00	24.00	0	0	0	136.68	-1.01
45.00	0.0	0.0	24.00	0	0	0	89.77	-1.82
45.00	6.43	0.0	48.00	0	0	0	96.39	25.64
45.00	16.25	0.0	60.00	0	0	0	117.14	42.15
45.00	48.00	0.0	72.00	1	0	0	177.52	-15.79
45.00	48.00	37.47	54.00	1	0	0	-89.12	-48.95

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 3   IDENTIFICATION: LOWER FRONT PANEL LEFT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	48.00	-41.57	0.0	1	0	0	108.44	37.84
-45.00	30.00	-37.47	0.0	1	0	0	150.88	16.68
-45.00	8.20	-12.00	0.0	0	0	0	-136.41	-24.21
-45.00	18.60	-12.00	-12.00	0	0	0	-159.91	-22.72
-45.00	48.00	-12.00	-22.48	1	0	0	176.35	19.96
-45.00	48.00	-37.47	-6.00	1	0	0	122.71	43.70
45.00	48.00	-41.57	0.0	0	0	0	-108.22	-37.85
45.00	30.00	-37.47	0.0	0	0	0	-54.12	-54.77
45.00	8.20	-12.00	0.0	0	0	0	75.03	-49.61
45.00	18.60	-12.00	-12.00	0	0	0	129.00	-66.18
45.00	48.00	-12.00	-22.48	0	0	0	-176.29	-20.19
45.00	48.00	-37.47	-6.00	0	0	0	-122.49	-43.75

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 4   IDENTIFICATION: LOWER FRONT PANEL RIGHT SIDE

SUN ELEVATION	0.0	XROT	114.00
A/C PITCH ATTITUDE	0.0	YROT	0.0
A/C ROLL ATTITUDE	0.0	ZROT	18.00
		DISTG	1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE, BUTTLINE, WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	48.00	41.57	0.0	0	0	0	108.22	-37.85
-45.00	30.00	37.47	0.0	0	0	0	54.12	-54.77
-45.00	8.20	12.00	0.0	0	0	0	-75.03	-49.61
-45.00	18.60	12.00	-12.00	0	0	0	-129.00	-66.18
-45.00	48.00	12.00	-22.48	0	0	0	176.29	-20.19
-45.00	48.00	37.47	-6.00	0	0	0	122.49	-43.75
45.00	48.00	41.57	0.0	1	0	0	-108.44	37.84
45.00	30.00	37.47	0.0	1	0	0	-150.88	16.68
45.00	8.20	12.00	0.0	0	0	0	136.41	-24.21
45.00	18.60	12.00	-12.00	0	0	0	159.91	-22.72
45.00	48.00	12.00	-22.48	1	0	0	-176.35	19.96
45.00	48.00	37.47	-6.00	1	0	0	-122.71	43.70

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 5   IDENTIFICATION: FORWARD SIDE PANEL LEFT SIDE

SUN ELEVATION	0.0	XROT	114.00
A/C PITCH ATTITUDE	0.0	YROT	0.0
A/C ROLL ATTITUDE	0.0	ZROT	18.00
		DISTG	1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE, BUTTLINE, WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	72.00	-48.00	24.00	1	0	0	90.01	0.05
-45.00	96.00	-48.00	24.00	1	0	0	90.07	0.05
-45.00	96.00	-44.50	42.00	1	0	0	99.37	-29.44
-45.00	96.00	-31.75	60.00	1	0	0	142.26	-44.50
-45.00	84.00	-31.75	60.00	1	0	0	142.26	-44.52
-45.00	72.00	-46.48	36.00	1	0	0	93.83	-20.02
45.00	72.00	-48.00	24.00	0	0	0	-89.80	-0.01
45.00	96.00	-48.00	24.00	0	0	0	-89.85	-0.01
45.00	96.00	-44.50	42.00	0	0	0	-99.14	29.49
45.00	96.00	-31.75	60.00	0	0	0	-142.05	44.65
45.00	84.00	-31.75	60.00	0	0	0	-142.06	44.67
45.00	72.00	-46.48	36.00	0	0	0	-93.61	20.06

CURVED PANELS WITH NO FENCES SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 6 IDENTIFICATION: FORWARD SIDE PANEL RIGHT SIDE

SUN ELEVATION	0.0		XROT	114.00
A/C PITCH ATTITUDE	0.0		YROT	0.0
A/C ROLL ATTITUDE	0.0		ZROT	18.00
			DISTG	1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	72.00	48.00	24.00	0	0	0	89.80	-0.01
-45.00	96.00	48.00	24.00	0	0	0	39.85	-0.01
-45.00	96.00	44.50	42.00	0	0	0	99.14	29.49
-45.00	96.00	31.75	60.00	0	0	0	142.05	44.65
-45.00	84.00	31.75	60.00	0	0	0	142.06	44.67
-45.00	72.00	46.48	36.00	0	0	0	93.61	20.06
45.00	72.00	48.00	24.00	1	0	0	-90.01	0.05
45.00	96.00	48.00	24.00	1	0	0	-90.07	0.05
45.00	96.00	44.50	42.00	1	0	0	-99.37	-29.44
45.00	96.00	31.75	60.00	1	0	0	-142.26	-44.50
45.00	84.00	31.75	60.00	1	0	0	-142.26	-44.52
45.00	72.00	46.48	36.00	1	0	0	-93.83	-20.02

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 7   IDENTIFICATION: AFT SIDE PANEL LEFT SIDE

SUN ELEVATION	0.0	XROT	114.00
A/C PITCH ATTITUDE	0.0	YROT	0.0
A/C ROLL ATTITUDE	0.0	ZROT	18.00
		DISTG	1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	GLINT ELEVATION
-45.00	108.00	-48.00	24.00	1	0	0	90.09	0.04
-45.00	144.00	-48.00	24.00	1	0	0	90.18	0.04
-45.00	144.00	-44.50	42.00	1	0	0	99.46	-29.39
-45.00	144.00	-31.75	60.00	1	0	0	142.23	-44.43
-45.00	108.00	-31.75	60.00	1	0	0	142.24	-44.49
-45.00	108.00	-44.50	42.00	1	0	0	99.40	-29.43
45.00	108.00	-48.00	24.00	0	0	0	-89.88	-0.00
45.00	144.00	-48.00	24.00	0	0	0	-89.96	-0.00
45.00	144.00	-44.50	42.00	0	0	0	-99.23	29.43
45.00	144.00	-31.75	60.00	0	0	0	-142.03	44.58
45.00	108.00	-31.75	60.00	0	0	0	-142.04	44.63
45.00	108.00	-44.50	42.00	0	0	0	-99.17	29.47

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 8   IDENTIFICATION: AFT SIDE PANEL RIGHT SIDE

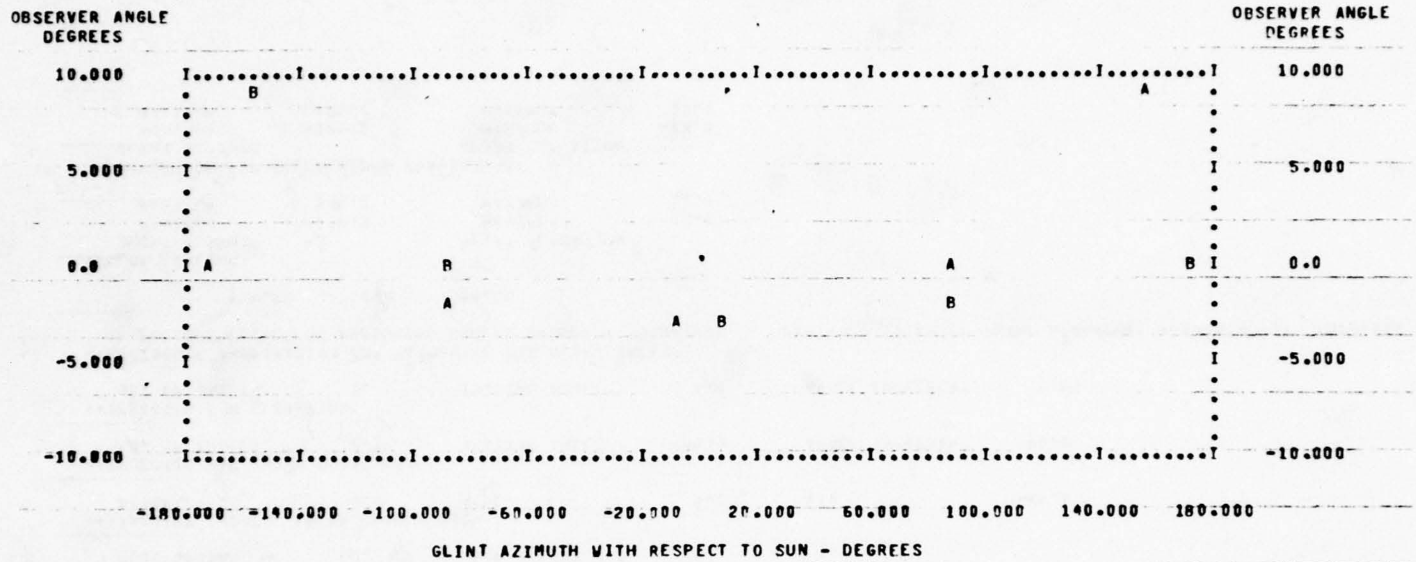
SUN ELEVATION	0.0	XROT	114.00
A/C PITCH ATTITUDE	0.0	YROT	0.0
A/C ROLL ATTITUDE	0.0	ZROT	18.00
		DISTG	1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	108.00	48.00	24.00	0	0	0	89.88	-0.00
-45.00	144.00	48.00	24.00	0	0	0	89.96	-0.00
-45.00	144.00	44.50	42.00	0	0	0	99.23	29.43
-45.00	144.00	31.75	60.00	0	0	0	142.03	44.58
-45.00	108.00	31.75	60.00	0	0	0	142.04	44.63
-45.00	108.00	44.50	42.00	0	0	0	99.17	29.47
45.00	108.00	48.00	24.00	1	0	0	-90.09	0.04
45.00	144.00	48.00	24.00	1	0	0	-90.18	0.04
45.00	144.00	44.50	42.00	1	0	0	-99.46	-29.39
45.00	144.00	31.75	60.00	1	0	0	-142.23	-44.43
45.00	108.00	31.75	60.00	1	0	0	-142.24	-44.49
45.00	108.00	44.50	42.00	1	0	0	-99.40	-29.43

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

SUN GLINT SIGNATURE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0



PROBABILITY: 0.556

KEY TO PLOT SYMBOLS

SYMBOL	A/C HEADING (DEG)	SYMBOL	A/C HEADING (DEG)
A	-45.00	F	
B	45.00	G	
C		K	
D		M	
E			

```
CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                        *** INPUT DATA ***

  **CONTROL OPTIONS
     DEFAULT OPTION         0.        PRINT OPTION          2.
     PLOT OPTION            2.        PROBABILITY OPT       1.

  **AIRCRAFT INITIAL EULER ORIENTATION
     PITCH                  0.0       ROLL                  0.0       YAW                 -45.0

  **SELECTED YAW ANGLE ROTATIONS
     NO. OF ANGLES          2.        INITIAL ANGLE       -45.0       ANGLE INCREMENT      90.0

  **SELECTED SUN ELEVATIONS
     NO. OF ANGLES          1.        INITIAL ANGLE         0.0       ANGLE INCREMENT       0.0

  **REFERENCE INFORMATION FOR MEASURING SUN GLINT ANGLES
     REFERENCE POINT FOR MEASURING ANGLES OF GLINT SIGNATURE      DISTANCE AT WHICH GLINT SIGNATURE FORMED (FT.)  1500.000
               X           Y          Z
            114.00        0.0       18.00

  **PLOT SCALING
     GLINT AZIMUTH                    GLINT ELEVATION
       MINIMUM          -180.0          MINIMUM         -10.0
       MAXIMUM           180.0          MAXIMUM          10.0

  **BOUNDARIES FOR CALCULATING PROBABILITY
     GLINT AZIMUTH                    GLINT ELEVATION
       MINIMUM          -180.0          MINIMUM         -10.0
       MAXIMUM           180.0          MAXIMUM          10.0
```

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CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                         *** INPUT DATA ***

**REFLECTIVE SURFACE DATA
  NO. OF SURFACES     10.

 *REFLECTIVE SURFACE NO.  1     IDENTIFICATION: WINDSHIELD FORWARD SECTION LEFT SIDE

   CURVE-FIT INPUT DATA
    DESIRED TERMS FOR CURVE-FITTING
      (1) X   TERM   1.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
      (6) YZ  TERM   0.     (7) XSQ TERM   1.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

    INPUT VALUES FOR COEFFICIENTS OF SURFACE
      (1) X   COEF   0.0          (2) Y   COEF   0.0          (3) Z   COEF   0.0
      (4) XY  COEF   0.0          (5) XZ  COEF   0.0          (6) YZ  COEF   0.0
      (7) XSQ COEF   0.0          (8) YSQ COEF   0.0          (9) ZSQ COEF   0.0
     (10) CONSTANT   0.0

   BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
               X        Y         Z                 X        Y         Z                 X        Y         Z
      ( 1)   48.00   -48.00     24.00        ( 2)   16.25   -36.00     24.00        ( 3)    6.43   -24.00     24.00
      ( 4)    0.0      0.0      24.00        ( 5)    6.43     0.0      48.00        ( 6)   16.25     0.0      60.00
      ( 7)   48.00     0.0      72.00        ( 8)   48.00   -37.47     54.00

 *REFLECTIVE SURFACE NO.  2     IDENTIFICATION: WINDSHIELD FORWARD SECTION RIGHT SIDE

   CURVE-FIT INPUT DATA
    DESIRED TERMS FOR CURVE-FITTING
      (1) X   TERM   1.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
      (6) YZ  TERM   0.     (7) XSG TERM   1.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

    INPUT VALUES FOR COEFFICIENTS OF SURFACE
      (1) X   COEF   0.0          (2) Y   COEF   0.0          (3) Z   COEF   0.0
      (4) XY  COEF   0.0          (5) XZ  COFF   0.0          (6) YZ  COEF   0.0
      (7) XSQ COEF   0.0          (8) YSQ COEF   0.0          (9) ZSQ COEF   0.0          B18
     (10) CONSTANT   0.0

   BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
               X        Y         Z                 X        Y         Z                 X        Y         Z
      ( 1)   48.00    48.00     24.00        ( 2)   16.25    36.00     24.00        ( 3)    6.43    24.00     24.00
      ( 4)    0.0      0.0      24.00        ( 5)    6.43     0.0      48.00        ( 6)   16.25     0.0      60.00
      ( 7)   48.00     0.0      72.00        ( 8)   48.00    37.47     54.00

 *REFLECTIVE SURFACE NO.  3     IDENTIFICATION: WINDSHIELD AFT SECTION LEFT SIDE
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CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                        *** INPUT DATA ***

 *REFLECTIVE SURFACE NO. 3     IDENTIFICATION: WINDSHIELD AFT SECTION LEFT SIDE

   CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
        (1) X   TERM  0.     (2) Y   TERM  0.     (3) Z   TERM  1.     (4) XY  TERM  0.     (5) XZ  TERM  0.
        (6) YZ  TERM  0.     (7) XSQ TERM  0.     (8) YSQ TERM  1.     (9) ZSQ TERM  1.

     INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF   0.0          (2) Y   COEF   0.0          (3) Z   COEF   0.0
        (4) XY  COEF   0.0          (5) XZ  COEF   0.0          (6) YZ  COEF   0.0
        (7) XSQ COEF   0.0          (8) YSQ COEF   0.0          (9) ZSQ COEF   0.0
       (10) CONSTANT   0.0

   BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
              X         Y          Z                X         Y          Z                X         Y          Z
     ( 1)   72.00      0.0       72.00     ( 2)   66.00    -31.75     60.00     ( 3)   60.00    -41.57     48.00
     ( 4)   48.00    -48.00      24.00     ( 5)   48.00    -37.47     54.00     ( 6)   48.00      0.0      72.00

 *REFLECTIVE SURFACE NO. 4     IDENTIFICATION: WINDSHIELD AFT SECTION RIGHT SIDE

   CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
        (1) X   TERM  0.     (2) Y   TERM  0.     (3) Z   TERM  1.     (4) XY  TERM  0.     (5) XZ  TERM  0.
        (6) YZ  TERM  0.     (7) XSQ TERM  0.     (8) YSQ TERM  1.     (9) ZSQ TERM  1.

     INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF   0.0          (2) Y   COEF   0.0          (3) Z   COEF   0.0
        (4) XY  COEF   0.0          (5) XZ  COEF   0.0          (6) YZ  COEF   0.0
        (7) XSQ COEF   0.0          (8) YSQ COEF   0.0          (9) ZSQ COEF   0.0
       (10) CONSTANT   0.0

   BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
              X         Y          Z                X         Y          Z                X         Y          Z
     ( 1)   72.00      0.0       72.00     ( 2)   66.00     31.75     60.00     ( 3)   60.00     41.57     48.00
     ( 4)   48.00     48.00      24.00     ( 5)   48.00     37.47     54.00     ( 6)   48.00      0.0      72.00

 *REFLECTIVE SURFACE NO. 5     IDENTIFICATION: LOWER FRONT PANEL LEFT SIDE
                                                                                    B19
   CURVE-FIT INPUT DATA
     DESIRED TERMS FOR CURVE-FITTING
        (1) X   TERM  1.     (2) Y   TERM  0.     (3) Z   TERM  1.     (4) XY  TERM  0.     (5) XZ  TERM  0.
        (6) YZ  TERM  0.     (7) XSQ TERM  1.     (8) YSQ TERM  1.     (9) ZSQ TERM  1.
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CURVED PANELS WITH NO FENCES    SAMPLE CASE TWO
                                                  *** INPUT DATA ***

     *REFLECTIVE SURFACE NO.  5      IDENTIFICATION: LOWER FRONT PANEL LEFT SIDE

        INPUT VALUES FOR COEFFICIENTS OF SURFACE
          (1) X   COEF   0.0             (2) Y   COEF   0.0             (3) Z   COEF   0.0
          (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
          (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
         (10) CONSTANT   0.0

       BOUNDARY POINTS -- BODY AXES   (STATIONLINE,BUTTLINE,WATERLINE)
                  X         Y          Z                   X         Y         Z                   X         Y         Z
       ( 1)     48.00    -41.57       0.0         ( 2)   30.00    -37.47      0.0        ( 3)     8.20    -12.00      0.0
       ( 4)     18.60    -12.00     -12.00        ( 5)   48.00    -12.00    -22.48       ( 6)    48.00    -37.47     -6.00

     *REFLECTIVE SURFACE NO.  6      IDENTIFICATION: LOWER FRONT PANEL RIGHT SIDE

       CURVE-FIT INPUT DATA
        DESIRED TERMS FOR CURVE-FITTING
          (1) X   TERM   1.      (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
          (6) YZ  TERM   0.      (7) XSQ TERM   1.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

        INPUT VALUES FOR COEFFICIENTS OF SURFACE
          (1) X   COEF   0.0             (2) Y   COEF   0.0             (3) Z   COEF   0.0
          (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
          (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
         (10) CONSTANT   0.0

       BOUNDARY POINTS -- BODY AXES   (STATIONLINE,BUTTLINE,WATERLINE)
                  X         Y          Z                   X         Y         Z                   X         Y         Z
       ( 1)     48.00     41.57       0.0         ( 2)   30.00     37.47      0.0        ( 3)     8.20     12.00      0.0
       ( 4)     18.60     12.00     -12.00        ( 5)   48.00     12.00    -22.48       ( 6)    48.00     37.47     -6.00

     *REFLECTIVE SURFACE NO.  7      IDENTIFICATION: FORWARD SIDE PANEL LEFT SIDE

       CURVE-FIT INPUT DATA
        DESIRED TERMS FOR CURVE-FITTING
          (1) X   TERM   0.      (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
          (6) YZ  TERM   0.      (7) XSQ TERM   0.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

        INPUT VALUES FOR COEFFICIENTS OF SURFACE
          (1) X   COEF   0.0             (2) Y   COEF   0.0             (3) Z   COEF   0.0
          (4) XY  COEF   0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
          (7) XSQ COEF   0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
         (10) CONSTANT   0.0
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CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                        *** INPUT DATA ***

  *REFLECTIVE SURFACE NO. 7      IDENTIFICATION: FORWARD SIDE PANEL LEFT SIDE

    BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                X         Y         Z                  X         Y         Z                  X         Y         Z
    ( 1)      72.00    -48.00     24.00       ( 2)   96.00    -48.00     24.00       ( 3)   96.00    -44.50     42.00
    ( 4)      96.00    -31.75     60.00       ( 5)   84.00    -31.75     60.00       ( 6)   72.00    -46.48     36.00

  *REFLECTIVE SURFACE NO. 8      IDENTIFICATION: FORWARD SIDE PANEL RIGHT SIDE

    CURVE-FIT INPUT DATA
      DESIRED TERMS FOR CURVE-FITTING
        (1) X   TERM   0.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
        (6) YZ  TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

      INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF     0.0            (2) Y   COEF    0.0            (3) Z   COEF    0.0
        (4) XY  COEF     0.0            (5) XZ  COEF    0.0            (6) YZ  COEF    0.0
        (7) XSQ COEF     0.0            (8) YSQ COEF    0.0            (9) ZSQ COEF    0.0
       (10) CONSTANT     0.0

    BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                X         Y         Z                  X         Y         Z                  X         Y         Z
    ( 1)      72.00     48.00     24.00       ( 2)   96.00     48.00     24.00       ( 3)   96.00     44.50     42.00
    ( 4)      96.00     31.75     60.00       ( 5)   84.00     31.75     60.00       ( 6)   72.00     46.48     36.00

  *REFLECTIVE SURFACE NO. 9      IDENTIFICATION: AFT SIDE PANEL LEFT SIDE

    CURVE-FIT INPUT DATA
      DESIRED TERMS FOR CURVE-FITTING
        (1) X   TERM   0.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
        (6) YZ  TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

      INPUT VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF     0.0            (2) Y   COEF    0.0            (3) Z   COEF    0.0
        (4) XY  COEF     0.0            (5) XZ  COEF    0.0            (6) YZ  COEF    0.0
        (7) XSQ COEF     0.0            (8) YSQ COEF    0.0            (9) ZSQ COEF    0.0
       (10) CONSTANT     0.0

    BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
                X         Y         Z                  X         Y         Z                  X         Y         Z
    ( 1)     108.00    -48.00     24.00       ( 2)  144.00    -48.00     24.00       ( 3)  144.00    -44.50     42.00
    ( 4)     144.00    -31.75     60.00       ( 5)  108.00    -31.75     60.00       ( 6)  108.00    -44.50     42.00
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CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

                                   *** INPUT DATA ***

*REFLECTIVE SURFACE NO. 10     IDENTIFICATION: AFT SIDE PANEL RIGHT SIDE

  CURVE-FIT INPUT DATA
    DESIRED TERMS FOR CURVE-FITTING
      (1) X   TERM   0.     (2) Y   TERM   0.     (3) Z   TERM   1.     (4) XY  TERM   0.     (5) XZ  TERM   0.
      (6) YZ  TERM   0.     (7) XSQ TERM   0.     (8) YSQ TERM   1.     (9) ZSQ TERM   1.

    INPUT VALUES FOR COEFFICIENTS OF SURFACE
      (1) X   COEF    0.0             (2) Y   COEF   0.0             (3) Z   COEF   0.0          822
      (4) XY  COEF    0.0             (5) XZ  COEF   0.0             (6) YZ  COEF   0.0
      (7) XSQ COEF    0.0             (8) YSQ COEF   0.0             (9) ZSQ COEF   0.0
     (10) CONSTANT    0.0

    BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATERLINE)
              X         Y         Z                  X         Y         Z                  X         Y         Z
      ( 1)  108.00     48.00     24.00       ( 2)  144.00     48.00     24.00       ( 3)  144.00     44.50     42.00
      ( 4)  144.00     31.75     60.00       ( 5)  108.00     31.75     60.00       ( 6)  108.00     44.50     42.00
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CURVED PANELS WITH NO FENCES    SAMPLE CASE TWO

                                          *** RESULTS OF CURVE-FIT ANALYSIS ***

**REFLECTIVE SURFACE DATA

   *REFLECTIVE SURFACE NO. 1      IDENTIFICATION: WINDSHIELD FORWARD SECTION LEFT SIDE

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF     0.6320E-01     (2) Y   COEF     0.0              (3) Z   COEF   -0.5745E-02
        (4) XY  COEF     0.0            (5) XZ  COEF     0.0              (6) YZ  COEF    0.0
        (7) XSQ COEF     0.4788E-03     (8) YSQ COEF     0.4787E-03       (9) ZSQ COEF    0.4787E-03
       (10) CONSTANT     0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.6116E-05

   *REFLECTIVE SURFACE NO. 2      IDENTIFICATION: WINDSHIELD FORWARD SECTION RIGHT SIDE

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF     0.6320E-01     (2) Y   COEF     0.0              (3) Z   COEF   -0.5745E-02
        (4) XY  COEF     0.0            (5) XZ  COEF     0.0              (6) YZ  COEF    0.0
        (7) XSQ COEF     0.4788E-03     (8) YSQ COEF     0.4787E-03       (9) ZSQ COEF    0.4787E-03
       (10) CONSTANT     0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.6116E-05

   *REFLECTIVE SURFACE NO. 3      IDENTIFICATION: WINDSHIELD AFT SECTION LEFT SIDE

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF     0.0            (2) Y   COEF     0.0              (3) Z   COEF   -0.5293E-02
        (4) XY  COEF     0.0            (5) XZ  COEF     0.0              (6) YZ  COEF    0.0
        (7) XSQ COEF     0.0            (8) YSQ COEF     0.4409E-03       (9) ZSQ COEF    0.4410E-03
       (10) CONSTANT    -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.9869E-05

   *REFLECTIVE SURFACE NO. 4      IDENTIFICATION: WINDSHIELD AFT SECTION RIGHT SIDE        B23

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF     0.0            (2) Y   COEF     0.0              (3) Z   COEF   -0.5293E-02
        (4) XY  COEF     0.0            (5) XZ  COEF     0.0              (6) YZ  COEF    0.0
        (7) XSQ COEF     0.0            (8) YSQ COEF     0.4409E-03       (9) ZSQ COEF    0.4410E-03
       (10) CONSTANT    -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.9869E-05
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CURVED PANELS WITH NO FENCES    SAMPLE CASE TWO

                                        *** RESULTS OF CURVE-FIT ANALYSIS ***

 **REFLECTIVE SURFACE DATA

   *REFLECTIVE SURFACE NO.  5     IDENTIFICATION: LOWER FRONT PANEL LEFT SIDE

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.6319E-01      (2) Y   COEF    0.0             (3) Z   COEF   -0.5735E-02
        (4) XY  COEF    0.0             (5) XZ  COEF    0.0             (6) YZ  COEF    0.0
        (7) XSQ COEF    0.4787E-03      (8) YSQ COEF    0.4786E-03      (9) ZSQ COEF    0.4786E-03
       (10) CONSTANT    0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.2958E-04

   *REFLECTIVE SURFACE NO.  6     IDENTIFICATION: LOWER FRONT PANEL RIGHT SIDE

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.6319E-01      (2) Y   COEF    0.0             (3) Z   COEF   -0.5735E-02
        (4) XY  COEF    0.0             (5) XZ  COEF    0.0             (6) YZ  COEF    0.0
        (7) XSQ COEF    0.4787E-03      (8) YSQ COEF    0.4786E-03      (9) ZSQ COEF    0.4786E-03
       (10) CONSTANT    0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.2958E-04

   *REFLECTIVE SURFACE NO.  7     IDENTIFICATION: FORWARD SIDE PANEL LEFT SIDE

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.0             (2) Y   COEF    0.0             (3) Z   COEF   -0.5312E-02
        (4) XY  COEF    0.0             (5) XZ  COEF    0.0             (6) YZ  COEF    0.0
        (7) XSQ COEF    0.0             (8) YSQ COEF    0.4419E-03      (9) ZSQ COEF    0.4414E-03
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.2322E-04

   *REFLECTIVE SURFACE NO.  8     IDENTIFICATION: FORWARD SIDE PANEL RIGHT SIDE        B24

      VALUES FOR COEFFICIENTS OF SURFACE
        (1) X   COEF    0.0             (2) Y   COEF    0.0             (3) Z   COEF   -0.5312E-02
        (4) XY  COEF    0.0             (5) XZ  COEF    0.0             (6) YZ  COEF    0.0
        (7) XSQ COEF    0.0             (8) YSQ COEF    0.4419E-03      (9) ZSQ COEF    0.4414E-03
       (10) CONSTANT   -0.1000E 01

      ROOT MEAN SQUARE ERROR OF FIT=  0.2322E-04
```

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CURVED PANELS WITH NO FENCES    SAMPLE CASE TWO

                                        *** RESULTS OF CURVE-FIT ANALYSIS ***

 **REFLECTIVE SURFACE DATA

    *REFLECTIVE SURFACE NO.  9      IDENTIFICATION: AFT SIDE PANEL LEFT SIDE

       VALUES FOR COEFFICIENTS OF SURFACE
          (1) X   COEF    0.0              (2) Y   COEF    0.0              (3) Z   COEF   -0.5307E-02
          (4) XY  COEF    0.0              (5) XZ  COEF    0.0              (6) YZ  COEF    0.0
          (7) XSQ COEF    0.0              (8) YSQ COEF    0.4410E-03       (9) ZSQ COEF    0.4413E-03
         (10) CONSTANT   -0.1000E 01

       ROOT MEAN SQUARE ERROR OF FIT=  0.4186E-15

    *REFLECTIVE SURFACE NO. 10      IDENTIFICATION: AFT SIDE PANEL RIGHT SIDE

       VALUES FOR COEFFICIENTS OF SURFACE
          (1) X   COEF    0.0              (2) Y   COEF    0.0              (3) Z   COEF   -0.5307E-02
          (4) XY  COEF    0.0              (5) XZ  COEF    0.0              (6) YZ  COEF    0.0
          (7) XSQ COEF    0.0              (8) YSQ COEF    0.4410E-03       (9) ZSQ COEF    0.4413E-03
         (10) CONSTANT   -0.1000E 01

       ROOT MEAN SQUARE ERROR OF FIT=  0.4186E-15
```

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 1   IDENTIFICATION: WINDSHIELD FORWARD SECTION LEFT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	48.00	-48.00	24.00	1	0	0	89.95	0.02
-45.00	16.25	-36.00	24.00	1	0	0	173.10	0.02
-45.00	6.43	-24.00	24.00	0	0	0	-149.65	0.02
-45.00	0.0	0.0	24.00	0	0	0	-89.74	0.02
-45.00	6.43	0.0	48.00	0	0	0	-106.13	37.75
-45.00	16.25	0.0	60.00	0	0	0	-141.81	44.64
-45.00	48.00	0.0	72.00	0	0	0	-179.85	0.17
-45.00	48.00	-37.47	54.00	1	0	0	122.73	-43.69
45.00	48.00	-48.00	24.00	0	0	0	-89.75	0.02
45.00	16.25	-36.00	24.00	0	0	0	-7.00	0.02
45.00	6.43	-24.00	24.00	0	0	0	30.02	0.02
45.00	0.0	0.0	24.00	0	0	0	89.74	0.02
45.00	6.43	0.0	48.00	0	0	0	106.13	37.75
45.00	16.25	0.0	60.00	0	0	0	141.81	44.64
45.00	48.00	0.0	72.00	0	0	0	179.85	0.17
45.00	48.00	-37.47	54.00	0	0	0	-122.51	43.77

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 2   IDENTIFICATION: WINDSHIELD FORWARD SECTION RIGHT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	48.00	48.00	24.00	0	0	0	89.75	0.02
-45.00	16.25	36.00	24.00	0	0	0	7.00	0.02
-45.00	6.43	24.00	24.00	0	0	0	-30.02	0.02
-45.00	0.0	0.0	24.00	0	0	0	-89.74	0.02
-45.00	6.43	0.0	48.00	0	0	0	-108.13	37.75
-45.00	16.25	0.0	60.00	0	0	0	-141.81	44.64
-45.00	48.00	0.0	72.00	0	0	0	-179.85	0.17
-45.00	48.00	37.47	54.00	0	0	0	122.51	43.77
45.00	48.00	48.00	24.00	1	0	0	-89.95	0.02
45.00	16.25	36.00	24.00	1	0	0	-173.10	0.02
45.00	6.43	24.00	24.00	0	0	0	149.65	0.02
45.00	0.0	0.0	24.00	0	0	0	89.74	0.02
45.00	6.43	0.0	48.00	0	0	0	108.13	37.75
45.00	16.25	0.0	60.00	0	0	0	141.81	44.64
45.00	48.00	0.0	72.00	0	0	0	179.85	0.17
45.00	48.00	37.47	54.00	1	0	0	-122.73	-43.69

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 3   IDENTIFICATION: WINDSHIELD AFT SECTION LEFT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE, BUTTLINE, WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	72.00	0.0	72.00	0	0	0	-179.91	0.17
-45.00	66.00	-31.75	60.00	1	0	0	142.24	-44.55
-45.00	60.00	-41.57	48.00	1	0	0	108.48	-37.80
-45.00	48.00	-48.00	24.00	1	0	0	89.96	0.02
-45.00	48.00	-37.47	54.00	1	0	0	122.73	-43.68
-45.00	48.00	0.0	72.00	0	0	0	-179.85	0.17
45.00	72.00	0.0	72.00	0	0	0	179.91	0.17
45.00	66.00	-31.75	60.00	0	0	0	-142.54	44.70
45.00	60.00	-41.57	48.00	0	0	0	-108.24	37.87
45.00	48.00	-48.00	24.00	0	0	0	-89.74	0.02
45.00	48.00	-37.47	54.00	0	0	0	-122.50	43.78
45.00	48.00	0.0	72.00	0	0	0	179.85	0.17

CURVED PANELS WITH NO FENCES SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 4 IDENTIFICATION: WINDSHIELD AFT SECTION RIGHT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	72.00	0.0	72.00	0	0	0	-179.91	0.17
-45.00	66.00	31.75	60.00	0	0	0	142.04	44.70
-45.00	60.00	41.57	48.00	0	0	0	108.24	37.87
-45.00	48.00	48.00	24.00	0	0	0	89.74	0.02
-45.00	48.00	37.47	54.00	0	0	0	122.50	43.78
-45.00	48.00	0.0	72.00	0	0	0	-179.65	0.17
45.00	72.00	0.0	72.00	0	0	0	179.91	0.17
45.00	66.00	31.75	60.00	1	0	0	-142.24	-44.55
45.00	60.00	41.57	48.00	1	0	0	-108.48	-37.80
45.00	48.00	48.00	24.00	1	0	0	-89.96	0.02
45.00	48.00	37.47	54.00	1	0	0	-122.73	-43.68
45.00	48.00	0.0	72.00	0	0	0	179.85	0.17

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 5   IDENTIFICATION: LOWER FRONT PANEL LEFT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE, BUTTLINE, WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	GLINT ELEVATION
-45.00	48.00	-41.57	0.0	1	0	0	108.44	37.84
-45.00	30.00	-37.47	0.0	1	0	0	150.88	16.68
-45.00	8.20	-12.00	0.0	0	0	0	-136.41	-24.21
-45.00	18.60	-12.00	-12.00	0	0	0	-159.91	-22.72
-45.00	48.00	-12.00	-22.48	1	0	0	176.35	19.96
-45.00	48.00	-37.47	-6.00	1	0	0	122.71	43.70
45.00	48.00	-41.57	0.0	0	0	0	-108.22	-37.85
45.00	30.00	-37.47	0.0	0	0	0	-54.12	-54.77
45.00	8.20	-12.00	0.0	0	0	0	75.03	-49.61
45.00	18.60	-12.00	-12.00	0	0	0	129.00	-66.18
45.00	48.00	-12.00	-22.48	0	0	0	-176.29	-20.19
45.00	48.00	-37.47	-6.00	0	0	0	-122.49	-43.75

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 6   IDENTIFICATION: LOWER FRONT PANEL RIGHT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	48.00	41.57	0.0	0	0	0	108.22	-37.85
-45.00	30.00	37.47	0.0	0	0	0	54.12	-54.77
-45.00	8.20	12.00	0.0	0	0	0	-75.03	-49.61
-45.00	18.60	12.00	-12.00	0	0	0	-129.00	-66.18
-45.00	48.00	12.00	-22.48	0	0	0	176.29	-20.19
-45.00	48.00	37.47	-6.00	0	0	0	122.49	-43.75
45.00	48.00	41.57	0.0	1	0	0	-108.44	37.84
45.00	30.00	37.47	0.0	1	0	0	-150.88	16.68
45.00	8.20	12.00	0.0	0	0	0	136.41	-24.21
45.00	18.60	12.00	-12.00	0	0	0	159.91	-22.72
45.00	48.00	12.00	-22.48	1	0	0	-176.35	19.96
45.00	48.00	37.47	-6.00	1	0	0	-122.71	43.70

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 7   IDENTIFICATION: FORWARD SIDE PANEL LEFT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	72.00	-48.00	24.00	1	0	0	90.01	0.05
-45.00	96.00	-48.00	24.00	1	0	0	90.07	0.05
-45.00	96.00	-44.50	42.00	1	0	0	99.37	-29.44
-45.00	96.00	-31.75	60.00	1	0	0	142.26	-44.50
-45.00	84.00	-31.75	60.00	1	0	0	142.26	-44.52
-45.00	72.00	-46.48	36.00	1	0	0	53.83	-20.02
45.00	72.00	-48.00	24.00	0	0	0	-89.80	-0.01
45.00	96.00	-48.00	24.00	0	0	0	-89.85	-0.01
45.00	96.00	-44.50	42.00	0	0	0	-99.14	29.49
45.00	96.00	-31.75	60.00	0	0	0	-142.05	44.65
45.00	84.00	-31.75	60.00	0	0	0	-142.06	44.67
45.00	72.00	-46.48	36.00	0	0	0	-93.61	20.06

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 8   IDENTIFICATION: FORWARD SIDE PANEL RIGHT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	72.00	48.00	24.00	0	0	0	89.80	-0.01
-45.00	96.00	48.00	24.00	0	0	0	89.65	-0.01
-45.00	96.00	44.50	42.00	0	0	0	99.14	29.49
-45.00	96.00	31.75	60.00	0	0	0	142.05	44.65
-45.00	84.00	31.75	60.00	0	0	0	142.06	44.67
-45.00	72.00	46.48	36.00	0	0	0	93.61	20.36
45.00	72.00	48.00	24.00	1	0	0	-90.01	0.05
45.00	96.00	48.00	24.00	1	0	0	-90.07	0.05
45.00	96.00	44.50	42.00	1	0	0	-99.37	-29.44
45.00	96.00	31.75	60.00	1	0	0	-142.26	-44.50
45.00	84.00	31.75	60.00	1	0	0	-142.26	-44.52
45.00	72.00	46.48	36.00	1	0	0	-93.83	-20.02

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CURVED PANELS WITH NO FENCES SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 9 IDENTIFICATION: AFT SIDE PANEL LEFT SIDE

SUN ELEVATION	0.0	XROT	114.00
A/C PITCH ATTITUDE	0.0	YROT	0.0
A/C ROLL ATTITUDE	0.0	ZROT	18.00
		DISTG	1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INREL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	108.00	-48.00	24.00	1	0	0	90.09	0.04
-45.00	144.00	-48.00	24.00	1	0	0	90.18	0.04
-45.00	144.00	-44.50	42.00	1	0	0	99.46	-29.39
-45.00	144.00	-31.75	60.00	1	0	0	142.23	-44.43
-45.00	108.00	-31.75	60.00	1	0	0	142.24	-44.49
-45.00	108.00	-44.50	42.00	1	0	0	99.40	-29.43
45.00	108.00	-48.00	24.00	0	0	0	-89.88	-0.00
45.00	144.00	-48.00	24.00	0	0	0	-89.96	-0.00
45.00	144.00	-44.50	42.00	0	0	0	-99.23	29.43
45.00	144.00	-31.75	60.00	0	0	0	-142.03	44.58
45.00	108.00	-31.75	60.00	0	0	0	-142.04	44.63
45.00	108.00	-44.50	42.00	0	0	0	-99.17	29.47

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

*** SUN GLINT SIGNATURE ***

REFLECTIVE SURFACE NO. 10   IDENTIFICATION: AFT SIDE PANEL RIGHT SIDE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0

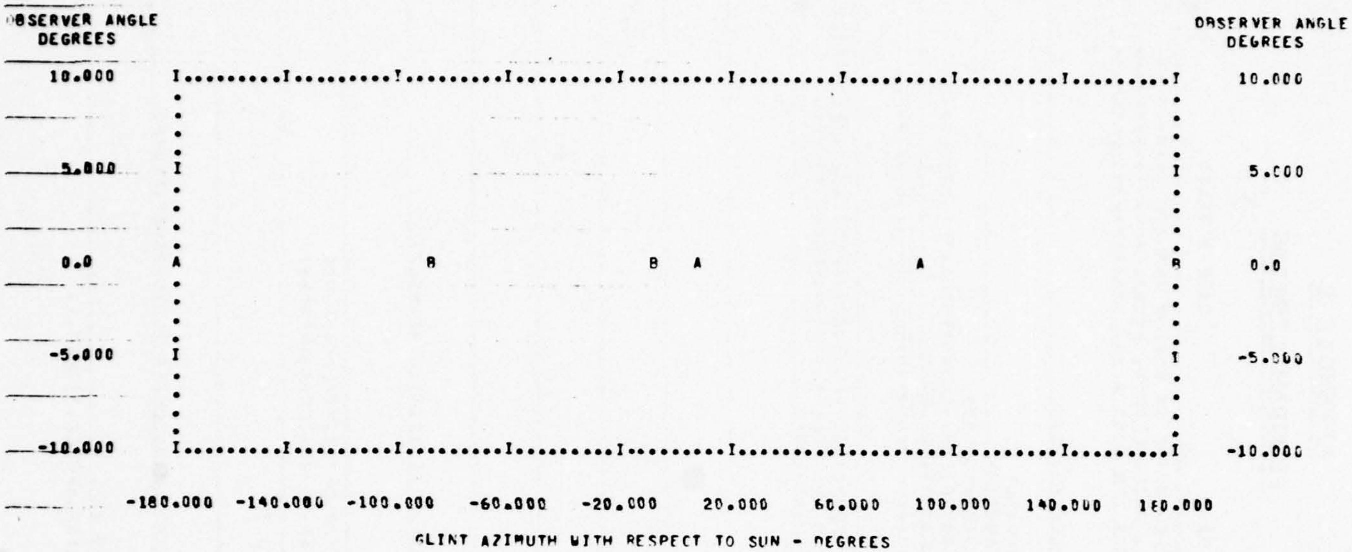
XROT 114.00
YROT 0.0
ZROT 18.00
DISTG 1500.00

A/C YAW	BOUNDARY POINTS -- BODY AXES (STATIONLINE,BUTTLINE,WATERLINE) X	Y	Z	STATUS FLAGS FOR POINTS INRFL	ISHAD	INTRF	GLINT AZIMUTH	ELEVATION
-45.00	108.00	48.00	24.00	0	0	0	89.88	-0.00
-45.00	144.00	48.00	24.00	0	0	0	89.96	-0.00
-45.00	144.00	44.50	42.00	0	0	0	59.23	29.43
-45.00	144.00	31.75	60.00	0	0	0	142.03	44.58
-45.00	108.00	31.75	60.00	0	0	0	142.04	44.63
-45.00	108.00	44.50	42.00	0	0	0	99.17	29.47
45.00	108.00	48.00	24.00	1	0	0	-90.09	0.04
45.00	144.00	48.00	24.00	1	0	0	-90.18	0.04
45.00	144.00	44.50	42.00	1	0	0	-99.46	-29.39
45.00	144.00	31.75	60.00	1	0	0	-142.23	-44.43
45.00	108.00	31.75	60.00	1	0	0	-142.24	-44.49
45.00	108.00	44.50	42.00	1	0	0	-99.40	-29.43

CURVED PANELS WITH NO FENCES   SAMPLE CASE TWO

SUN GLINT SIGNATURE

SUN ELEVATION 0.0
A/C PITCH ATTITUDE 0.0
A/C ROLL ATTITUDE 0.0



PROBABILITY: 0.497

KEY TO PLOT SYMBOLS

SYMBOL	A/C HEADING (DEG)	SYMBOL	A/C HEADING (DEG)
A	-45.00	F	
B	45.00	G	
C		K	
D		M	
E			

APPENDIX B

PROGRAM LISTING

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G LEVEL  21                    MAIN                 DATE = 78103          08/54/44

C********* PROGRAMMED BY FRED WHITE ON BOEING IBM 370 ***********
C*********** BOEING VERTOL, PHILADELPHIA, PENNA. *****************
C************* AREA CODE 215 522-2256 ****************************
C
C
      REAL*8 XCURF(450),FCURF(50),SIG
      REAL*8 CFALP(9)
      DIMENSION ALP(50),BALP(50)
      DIMENSION SIGF(20),SIGS(12)
      DIMENSION COEFFB(80),COEFSB(120)
      DIMENSION DATAC(30),DATAF(200),DATAS(1500),TITLES(960),
     1 MF(20),MS(12),DWORKS(120),DWKSP2(120)
      DIMENSION ALPHA2(800),BETA2(800),INTRFL(800),ISHADW(800),
     1 INTERF(800)
      DIMENSION IPLTOL(432)
      DIMENSION IBUF(1000),XPLOT(63),YPLOT(63),APLOT(432),BPLOT(432)
      COMMON/TOLRS/TOLEQN,TOLSNT,TOLQPT,TOLINT,TOLCK1,TOLCK2,
     1 TOLCK4,DELT,TOLCIR,ANGST2,TOLPLT
      TOLEQN=0.000001
      TOLSNT=0.0001
      TOLGPT=0.00000001
      TOLINT=0.02
      TOLCK1=0.02
      TOLCK2=0.02
      TOLCK4=0.02
      DELT=0.10
      TOLCIR=0.0001
      ANGST2=90.
      TOLPLT=0.0001
      DO 5 I=1,30
    5 DATAC(I)=0.0
      DO 6 I=1,200
    6 DATAF(I)=0.
      DO 7 I=1,1500
    7 DATAS(I)=0.
      CALL INPUT(DATAC,DATAF,DATAS,TITLES,MF,MS,0)
      KPRINT=DATAC(2)+0.5
      IPLOT=DATAC(24)+0.5
      IPROBL=DATAC(25)+0.5
      CALL OUTPT1(DATAC,DATAF,DATAS,TITLES,MF,MS)
      CALL INPUT(DATAC,DATAF,DATAS,TITLES,MF,MS,1)
      NFENCE=DATAC(22)+0.5
      IF(NFENCE.EQ.0) GO TO 14
      DO 12 I=1,NFENCE
      L=MF(I)
      NPTS=DATAF(L)+0.5
      ISTART=L+1
      CALL CFITF(DATAF,ISTART,NPTS,COEFFB,I,SIG,XCURF,FCURF)
      SIGF(I)=SIG
   12 CONTINUE
      IF(KPRINT.LT.2) GO TO 14
      CALL OUTPT2(COEFFB,SIGF,NFENCE,TITLES,1)
```

```
 14   CONTINUE
      NPANEL=DATAC(23)+0.5
      DO 15 I=1,NPANEL
      L=MS(I)
      NPTS=DATAS(L)+0.5
      ISTART=L+1
      CALL CFITS(DATAC,DATAS,ISTART,NPTS,COEFSB,I,SIG,XCURF,FCURF)
      SIGS(I)=SIG
 15   CONTINUE
      IF(KPRINT.LT.2) GO TO 16
      CALL OUTPT2(COEFSB,SIGS,NPANEL,TITLES,2)
 16   CONTINUE
      NGAM=DATAC(6)+0.5
      DGAM=DATAC(8)
      GAMMA=DATAC(7)-DGAM
      IF(IPLOT.EQ.0.OR.IPLOT.EQ.2) GO TO 17
      JCONT=0
      CALL PLOTS(IBUF,1000,9)
 17   CONTINUE
      DO 30 I=1,NGAM
      GAMMA=GAMMA+DGAM
      CALL GLINT(DATAC,DATAS,MS,COEFSB,GAMMA,ALPHA2,BETA2,INTRFL,
     1 ISHADW,INTERF,DWORKS,DATAF,MF)
      IF(KPRINT.LT.1) GO TO 18
      CALL OUTPT3(DATAC,DATAS,MS,TITLES,GAMMA,ALPHA2,BETA2,INTRFL,
     1 ISHADW,INTERF)
 18   CONTINUE
      CALL MINMAX(DATAC,DATAS,MS,ALPHA2,BETA2,APLOT,BPLOT,INTRFL,
     1 ISHADW,INTERF,IPLTOL)
      IF(IPROBL.EQ.0) GO TO 19
      CALL PROPL(DATAC,DATAS,MS,APLOT,BPLOT,XPLOT,YPLOT,DWORKS,DWKSP2,
     1 VPROBL,IPLTOL)
 19   CONTINUE
      IF(IPLOT.EQ.0.OR.IPLOT.EQ.1) GO TO 20
      CALL PLOTOL(DATAC,DATAS,MS,TITLES,GAMMA,APLOT,BPLOT,
     1 VPROBL,IPLTOL)
 20   CONTINUE
      IF(IPLOT.EQ.0.OR.IPLOT.EQ.2) GO TO 21
      CALL ORPLOT(DATAC,DATAS,MS,        GAMMA,ALPHA2,BETA2,INTRFL,
     1 ISHADW,INTERF,XPLOT,YPLOT,IBUF,JCONT,DWORKS,DWKSP2,VPROBL)
 21   CONTINUE
 30   CONTINUE
      IF(IPLOT.EQ.0.OR.IPLOT.EQ.2) GO TO 31
      CALL PLOT(10.0,0,999)
 31   CONTINUE
      STOP
      END
```

```
      SUBROUTINE INPUT(DATAC,DATAF,DATAS,TITLES,MF,MS,IDTRAN)
      DIMENSION DATAC(1),DATAF(1),DATAS(1),TITLES(1),MF(1),MS(1)
      DATA BLANK/1H /
      IF(IDTRAN.EQ.1) GO TO 80
      READ(5,101) (TITLES(I),I=1,72)
      DO 2 I=73,80
    2 TITLES(I)=BLANK
      LT=80
      READ(5,100) DEFLT,PRINT,THETA,PHI.
      IF(DEFLT.LT.0.5) DEFLT=0.
      IF(PRINT.LT.0.5) PRINT=0.
      IF(ABS(THETA).LT.0.001) THETA=0.
      IF(ABS(PHI).LT.0.001) PHI=0.
      DATAC(1)=DEFLT
      DATAC(2)=PRINT
      DATAC(3)=0.
      DATAC(4)=THETA
      DATAC(5)=PHI
      READ(5,100) GAMN,GAMI,DGAM,PSIN,PSII,DPSI
      IF(GAMN.GT.0.5) GO TO 3
      GAMN=3.
      GAMI=0.
      DGAM=30.
    3 IF(PSIN.GT.0.5) GO TO 5
      PSIN=9.
      PSII=-180.
      DPSI=45.
    5 DATAC(6)=GAMN
      DATAC(7)=GAMI
      DATAC(8)=DGAM
      DATAC(9)=PSIN
      DATAC(10)=PSII
      DATAC(11)=DPSI
      READ(5,100) XROT,YROT,ZROT
      IF(ABS(XROT).LT.0.001) XROT=0.
      IF(ABS(YROT).LT.0.001) YROT=0.
      IF(ABS(ZROT).LT.0.001) ZROT=0.
      DATAC(12)=XROT
      DATAC(13)=YROT
      DATAC(14)=ZROT
      READ(5,100) DISTG,ELVMIN,ELVMAX,AZMMIN,AZMMAX
      IF(ABS(DISTG).LT.0.001) DISTG=1000.
      IF(ABS(ELVMIN).GT.0.001) GO TO 6
      IF(ABS(ELVMAX).GT.0.001) GO TO 6
      ELVMIN=-10.
      ELVMAX=10.
    6 IF(ABS(AZMMIN).GT.0.001) GO TO 7
      IF(ABS(AZMMAX).GT.0.001) GO TO 7
      AZMMIN=-180.
      AZMMAX=180.
    7 DATAC(15)=DISTG
      DATAC(16)=ELVMIN
```

```
      DATAC(17)=ELVMAX
      DATAC(18)=AZMMIN
      DATAC(19)=AZMMAX
      READ(5,100) FENCES,PANELS,PLOT,PROBL
      DATAC(22)=FENCES
      DATAC(23)=PANELS
      DATAC(24)=PLOT
      DATAC(25)=PROBL
      LOC=1
      IF(DATAC(22).LT.0.5) GO TO 30
      NFENCE=DATAC(22)+0.5
      DO 20 I=1,NFENCE
      READ(5,100) DATAF(LOC)
      NPTS=DATAF(LOC)+0.5
      MF(I)=LOC
      N3=3*NPTS
      READ(5,100) (DATAF(LOC+J),J=1,N3)
   20 LOC=LOC+N3+1
   30 NPANEL=DATAC(23)+0.5
      LOC=1
      DO 40 I=1,NPANEL
      MS(I)=LOC+20
      READ(5,101) (TITLES(LT+J),J=1,72)
      DO 301 J=73,80
  301 TITLES(LT+J)=BLANK
      LT=LT+80
      READ(5,100) DATAS(LOC)
      IF(DATAS(LOC).GT.0.5) GO TO 32
      IF(DATAC(1).GT.0.5) GO TO 310
      READ(5,100) (DATAS(LOC+J),J=1,9)
      READ(5,100) (DATAS(LOC+J),J=10,19)
  310 READ(5,100) DATAS(LOC+20)
      NPTS=DATAS(LOC+20)+0.5
      N3P20=20+3*NPTS
      READ(5,100) (DATAS(LOC+J),J=21,N3P20)
      GO TO 38
   32 IF(I.EQ.1) GO TO 70
      ISYM=DATAS(LOC)+0.5
      DO 34 J=1,20
   34 DATAS(LOC+J)=DATAS(LOCP+J)
      NPTS=DATAS(LOC+20)+0.5
      DO 35 J=1,NPTS
      L=(J-1)*3
      DATAS(LOC+21+L)=DATAS(LOCP+21+L)
      DATAS(LOC+22+L)=DATAS(LOCP+22+L)
      DATAS(LOC+23+L)=DATAS(LOCP+23+L)
      IF(ISYM.EQ.1) DATAS(LOC+22+L)=-DATAS(LOC+22+L)
      IF(ISYM.EQ.2) DATAS(LOC+23+L)=-DATAS(LOC+23+L)
      IF(ISYM.EQ.3) DATAS(LOC+21+L)=-DATAS(LOC+21+L)
   35 CONTINUE
   38 LOCP=LOC
   40 LOC=LOC+21+3*NPTS
```

```
      NT=NPANEL+1
      DO 68 I=1,NT
      L=(I-1)*80
      NB=0
      DO 62 J=1,80
      IF(TITLES(L+J).NE.BLANK) GO TO 63
   62 NB=NB+1
   63 IF(NB.EQ.80) GO TO 68
      IF(NB.EQ.0) GO TO 68
      DO 66 J=1,80
      K=J+NB
      IF(K.GT.80) GO TO 64
      TITLES(L+J)=TITLES(L+K)
      GO TO 66
   64 TITLES(L+J)=BLANK
   66 CONTINUE
   68 CONTINUE
      RETURN
   70 WRITE(6,500)
      STOP
  500  FORMAT(1H1,'ERROR IN INPUT, SYMMETRICAL PANEL CANNOT BE FIRST')
  100 FORMAT(6E10.0)
  101 FORMAT(80A1)
   80 CONTINUE
      IF(DATAC(22).LT.0.5) GO TO 90
      NFENCE=DATAC(22)+0.5
      DO 88 I=1,NFENCE
      LOC=MF(I)
      NPTS=DATAF(LOC)+0.5
      DO 86 J=1,NPTS
      DO 86 JJ=1,3
      LJ=(J-1)*3+JJ
   86 DATAF(LOC+LJ)=DATAF(LOC+LJ)-DATAC(JJ+11)
   88 CONTINUE
   90 CONTINUE
      NPANEL=DATAC(23)+0.5
      DO 96 I=1,NPANEL
      LOCP20=MS(I)
      NPTS=DATAS(LOCP20)+0.5
      DO 94 J=1,NPTS
      DO 94 JJ=1,3
      LJ=(J-1)*3+JJ
   94 DATAS(LOCP20+LJ)=DATAS(LOCP20+LJ)-DATAC(JJ+11)
   96 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE OUTPT1(DATAC,DATAF,DATAS,TITLES,MF,MS)
      DIMENSION DATAC(1),DATAF(1),DATAS(1),TITLES(1),MF(1),MS(1)
      WRITE(6,102) (TITLES(I),I=1,80)
  102 FORMAT(1H1,80A1)
      WRITE(6,101)
  101 FORMAT(1H0,51X,'*** INPUT DATA ***')
      WRITE(6,103) DATAC(1),DATAC(2),DATAC(24),DATAC(25)
  103 FORMAT(1H0,2X,'**CONTROL OPTIONS'/1H ,5X,'DEFAULT OPTION',7X,F2.0,
     1 8X,'PRINT OPTION',9X,F2.0/
     2          1H ,5X,'PLOT OPTION',10X,F2.0,8X,'PROBABILITY OPT',6X,
     3 F2.0)
      WRITE(6,104) DATAC(4),DATAC(5),DATAC(10)
  104 FORMAT(1H0,2X,'**AIRCRAFT INITIAL EULER ORIENTATION'/1H ,5X,'PITCH
     1',13X,F6.1,7X,'ROLL',14X,F6.1,7X,'YAW',15X,F6.1)
      WRITE(6,105) (DATAC(I),I=9,11)
  105 FORMAT(1H0,2X,'**SELECTED YAW ANGLE ROTATIONS'/1H ,5X,'NO. OF ANGL
     2ES',6X,F4.0,8X,'INITIAL ANGLE',5X,F6.1,7X,'ANGLE INCREMENT',3X,F6.
     31)
      WRITE(6,106) (DATAC(I),I=6,8)
  106 FORMAT(1H0,2X,'**SELECTED SUN ELEVATIONS'/1H ,5X,'NO. OF ANGLES',
     1 6X,F4.0,8X,'INITIAL ANGLE',5X,F6.1,7X,'ANGLE INCREMENT',3X,F6.1)
      WRITE(6,107) DATAC(15),DATAC(12),DATAC(13),DATAC(14)
  107 FORMAT(1H0,2X,'**REFERENCE INFORMATION FOR MEASURING SUN GLINT ANG
     1LES'/1H ,5X,'REFERENCE POINT FOR MEASURING ANGLES OF GLINT SIGNATU
     2RE',5X,'DISTANCE AT WHICH GLINT SIGNATURE FORMED (FT.)',F10.3/1H ,
     3 18X,'X',9X,'Y',9X,'Z'/1H ,14X,3(F7.2,3X))
      WRITE(6,108) DATAC(18),DATAC(16),DATAC(19),DATAC(17)
  108 FORMAT(1H0,2X,'**PLOT SCALING'/1H ,5X,'GLINT AZIMUTH',18X,'GLINT E
     1LEVATION'/1H ,7X,'MINIMUM',8X,F6.1,10X,'MINIMUM',8X,F6.1/1H ,7X,
     2 'MAXIMUM',8X,F6.1,10X,'MAXIMUM',8X,F6.1)
      WRITE(6,109) DATAC(18),DATAC(16),DATAC(19),DATAC(17)
  109 FORMAT(1H0,2X,'**BOUNDARIES FOR CALCULATING PROBABILITY'/1H ,5X,
     1 'GLINT AZIMUTH',18X,'GLINT ELEVATION'/1H ,7X,'MINIMUM',8X,F6.1,
     2 10X,'MINIMUM',8X,F6.1/1H ,7X,'MAXIMUM',8X,F6.1,10X,'MAXIMUM',8X,
     3F6.1)
      IF(DATAC(22).LT.0.5) GO TO 25
      WRITE(6,102) (TITLES(MMM),MMM=1,80)
      WRITE(6,101)
      WRITE(6,110) DATAC(22)
  110 FORMAT(1H0,2X,'**FENCE DATA'/1H ,5X,'NO. OF FENCES',7X,F3.0)
      LINES=5
      NFENCE=DATAC(22)+0.5
      DO 20 I=1,NFENCE
      M2=MF(I)
      WRITE(6,111)
      LINES=LINES+2
      IF((LINES+6).LE.50) GO TO 4
      WRITE(6,102) (TITLES(MMM),MMM=1,80)
      WRITE(6,101)
      WRITE(6,111)
      LINES=5
    4 WRITE(6,112) I,DATAF(M2)
```

```
  111  FORMAT(1H0)
  112  FORMAT(1H ,5X,'*FENCE NO.',I3/1H ,7X,'NUMBER OF POINTS',4X,F3.0/
      1 1H0,7X,'BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE,WATER
      XLINE)'
      1                                          /1H ,3(18X,'X',9X,'Y',9X,
      2 'Z',2X))
       LINES=LINES+5
       NPTS=DATAF(M2)+0.5
       ND3=NPTS/3
       DO 10 L=1,ND3
       J=(L-1)*9+M2
       K=(L-1)*3+1
       KP1=K+1
       KP2=K+2
       IF((LINES+1).LE.50) GO TO 8
       WRITE(6,102) (TITLES(MMM),MMM=1,80)
       WRITE(6,101)
       WRITE(6,113) I
  113  FORMAT(1H0,5X,'*FENCE NO.',I3/1H ,7X,'BOUNDARY POINTS -- BODY AXES
      X  (STATIONLINE,BUTTLINE,WATERLINE)'
      1 /1H ,3(18X,'X',9X,'Y',9X,'Z',2X))
       LINES=7
    8  WRITE(6,114) K,(DATAF(J+M),M=1,3),KP1,(DATAF(J+M),M=4,6),
      1 KP2,(DATAF(J+M),M=7,9)
  114  FORMAT(1H ,2X,3(6X,'(',I2,')',2X,2(F7.2,3X),F7.2,2X))
   10  LINES=LINES+1
       IF(3*ND3.EQ.NPTS) GO TO 20
       J=ND3*9+M2
       K=3*ND3+1
       IF((3*ND3+1).EQ.NPTS) WRITE(6,115) K,(DATAF(J+M),M=1,3)
       KP1=K+1
       IF((3*ND3+2).EQ.NPTS) WRITE(6,116) K,(DATAF(J+M),M=1,3),
      1 KP1,(DATAF(J+M),M=4,6)
       LINES=LINES+1
  115  FORMAT(1H ,8X,'(',I2,')',2X,2(F7.2,3X),F7.2)
  116  FORMAT(1H ,2X,2(6X,'(',I2,')',2X,2(F7.2,3X),F7.2,2X))
   20  CONTINUE
   25  CONTINUE
       WRITE(6,102) (TITLES(MMM),MMM=1,80)
       WRITE(6,101)
       NPANEL=DATAC(23)+0.5
       WRITE(6,117) DATAC(23)
  117  FORMAT(1H0,2X,'**REFLECTIVE SURFACE DATA'/1H ,5X,'NO. OF SURFACES'
      1,5X,F3.0)
       LINES=6
       LT=0
       DO 70 I=1,NPANEL
       LT=LT+80
       M2=MS(I)-20
       IF((LINES+6).LE.50) GO TO 27
       WRITE(6,102) (TITLES(MMM),MMM=1,80)
       WRITE(6,101)
```

```
      LINES=3
   27 WRITE(6,118) I,(TITLES(LT+J),J=1,80)
  118 FORMAT(1H0,5X,'*REFLECTIVE SURFACE NO.',I3,5X,'IDENTIFICATION: ',
     1 80A1)
      LINES=LINES+2
      IF((LINES+5).LE.50) GO TO 30
      WRITE(6,102) (TITLES(MMM),MMM=1,80)
      WRITE(6,101)
      LINES=3
      WRITE(6,118) I,(TITLES(LT+J),J=1,80)
      LINES=LINES+2
   30 WRITE(6,120) (DATAS(M2+J),J=1,9)
  120 FORMAT(1H0,7X,'CURVE-FIT INPUT DATA'/1H ,9X,'DESIRED TERMS FOR CUR
     1VE-FITTING'/1H ,11X,'(1) X   TERM ',F4.0,5X,'(2) Y   TERM ',F4.0,
     2 5X,'(3) Z   TERM ',F4.0,5X,'(4) XY  TERM ',F4.0,5X,'(5) XZ  TERM
     3',F4.0/1H ,11X,'(6) YZ  TERM ',F4.0,5X,'(7) XSQ TERM ',F4.0,5X,
     4 '(8) YSQ TERM ',F4.0,5X,'(9) ZSQ TERM ',F4.0)
      LINES=LINES+5
      IF((LINES+6).LE.50) GO TO 40
      WRITE(6,102) (TITLES(MMM),MMM=1,80)
      WRITE(6,101)
      LINES=3
      WRITE(6,118) I,(TITLES(LT+J),J=1,80)
      LINES=LINES+2
   40 WRITE(6,121) (DATAS(M2+J),J=10,18)
  121 FORMAT(1H0,9X,'INPUT VALUES FOR COEFFICIENTS OF SURFACE'/1H ,11X,
     1 '(1) X    COEF ',E12.4,5X,'(2) Y    COEF ',E12.4,5X,'(3) Z    COEF '
     X,E12.4/1H ,11X,
     2 '(4) XY   COEF ',E12.4,5X,'(5) XZ   COEF ',E12.4,5X,'(6) YZ   COEF '
     3,E12.4/1H ,11X,'(7) XSQ COEF ',E12.4,5X,'(8) YSQ COEF ',E12.4,5X,
     4 '(9) ZSQ COEF ',E12.4)
      WRITE(6,123) DATAS(M2+19)
  123 FORMAT(1H ,10X,'(10) CONSTANT ',E12.4)
      LINES=LINES+6
      IF((LINES+4).LE.50) GO TO 50
      WRITE(6,102) (TITLES(MMM),MMM=1,80)
      WRITE(6,101)
      LINES=3
      WRITE(6,118) I,(TITLES(LT+J),J=1,80)
      LINES=LINES+2
   50 WRITE(6,122)
  122 FORMAT(1H0,7X,'BOUNDARY POINTS -- BODY AXES  (STATIONLINE,BUTTLINE
     X,WATERLINE)'/1H ,3(18X,'X',9X,
     1 'Y',9X,'Z',2X))
      LINES=LINES+3
      NPTS=DATAS(M2+20)+0.5
      ND3=NPTS/3
      DO 60 L=1,ND3
      J=(L-1)*9+20+M2
      K=(L-1)*3+1
      KP1=K+1
      KP2=K+2
```

```
      IF((LINES+1).LE.50) GO TO 52
      WRITE(6,102) (TITLES(MMM),MMM=1,80)
      WRITE(6,101)
      WRITE(6,118) I,(TITLES(LT+K),K=1,80)
      LINES=5
   52 WRITE(6,114) K,(DATAS(J+M),M=1,3),KP1,(DATAS(J+M),M=4,6),
     1 KP2,(DATAS(J+M),M=7,9)
   60 LINES=LINES+1
      IF(3*ND3.EQ.NPTS) GO TO 70
      J=ND3*9+20*M2
      K=ND3*3+1
      IF((3*ND3+1).EQ.NPTS) WRITE(6,115) K,(DATAS(J+M),M=1,3)
      KP1=K+1
      IF((3*ND3+2).EQ.NPTS) WRITE(6,116) K,(DATAS(J+M),M=1,3),
     1 KP1,(DATAS(J+M),M=4,6)
      LINES=LINES+1
   70 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE CFITF(DATAF,ISTART,NPTS,COEFFB,ICOF,SIG,XCURF,FCURF)
      REAL*8 XCURF(1),FCURF(1),COFB(3),SIG,DET
      REAL*8 XPTS(10),YPTS(10),ZPTS(10)
      DIMENSION IFIT(9)
      DIMENSION DATAF(1),COEFFB(1)
      CALL NORM(DATAF,ISTART,NPTS,TNORM)
      DO 10 L=1,NPTS
      LJ=(L-1)*3+ISTART-1
      FCURF(L)=1.
      XPTS(L)=DATAF(LJ+1)/TNORM
      YPTS(L)=DATAF(LJ+2)/TNORM
      ZPTS(L)=DATAF(LJ+3)/TNORM
      DO 10 J=1,3
      JJ=(L-1)*3+J
   10 XCURF(JJ)=DATAF(LJ+J)/TNORM
      CALL CURFIT(FCURF,XCURF,3,NPTS,COFB,DET,SIG,1)
      DO 15 I=1,3
   15 IFIT(I)=1
      DO 18 I=4,9
   18 IFIT(I)=0
      CALL SIGNF(COFB,3,DET,XPTS,YPTS,ZPTS,NPTS,IFIT)
      L=(ICOF-1)*4
      DO 20 I=1,3
   20 COEFFB(L+I)=COFB(I)/TNORM
      COEFFB(L+4)=-DET
      RETURN
      END
```

```
      SUBROUTINE NORM(DATA,ISTART,NPTS,TNORM)
      DIMENSION DATA(1)
      TNORM=0.
      DO 20 I=1,NPTS
      L=(I-1)*3+ISTART-1
      DO 20 J=1,3
   20 TNORM=TNORM+ DATA(L+J)**2
      TNORM=TNORM/3./NPTS
      TNORM=SQRT(TNORM)
      RETURN
      END
```

```
      SUBROUTINE CURFIT(F,X,N,M,COEF,DET,SIG,NH)
      IMPLICIT REAL*8 (A-H,O-Z)
      DIMENSION A(9,9),B(9),X(1),F(1),COEF(1)
      DO 10 I=1,N
      B(I)=0.0
      DO 10 J=1,N
   10 A(I,J)=0.0
      DO 20 I=1,M
      DO 20 J=1,N
      JJ=J+(I-1)*N
      B(J)=B(J)+F(I)*X(JJ)
      DO 20 L=1,N
      LL=L+(I-1)*N
   20 A(L,J)=A(L,J)+X(JJ)*X(LL)
      CALL EQNSOL(A,B,N,COEF,DET,NH)
      SIG=0.0
      DO 40 I=1,M
      SUM=0.0
      DO 30 J=1,N
      JJ=J+(I-1)*N
   30 SUM=SUM+COEF(J)*X(JJ)
      SUM=SUM-DET
   40 SIG=SIG+SUM*SUM
      SIG=DSQRT(SIG/M)
      RETURN
      END
```

```
      SUBROUTINE SIGNF(COFB,NCOFS,DET,XPTS,YPTS,ZPTS,NPTS,IFIT)
      REAL*8 VNORM(3),XVECT(3),XMAG,VMAG,DSQRT
      REAL*8 COFB(1),DET,XPTS(1),YPTS(1),ZPTS(1)
      DIMENSION IFIT(1)
      COSANG=0.
      DO 20 L=1,NPTS
      XMAG=DSQRT(XPTS(L)*XPTS(L)+YPTS(L)*YPTS(L)+ZPTS(L)*ZPTS(L))
      IF(XMAG.LT.1.0D-10) GO TO 20
      XVECT(1)=XPTS(L)/XMAG
      XVECT(2)=YPTS(L)/XMAG
      XVECT(3)=ZPTS(L)/XMAG
      DO 1 I=1,3
    1 VNORM(I)=0.
      I=0
      IF(IFIT(1).EQ.0) GO TO 2
      I=I+1
      VNORM(1)=VNORM(1)+COFB(I)
      IF(I.EQ.NCOFS) GO TO 10
    2 IF(IFIT(2).EQ.0) GO TO 3
      I=I+1
      VNORM(2)=VNORM(2)+COFB(I)
      IF(I.EQ.NCOFS) GO TO 10
    3 IF(IFIT(3).EQ.0) GO TO 4
      I=I+1
      VNORM(3)=VNORM(3)+COFB(I)
      IF(I.EQ.NCOFS) GO TO 10
    4 IF(IFIT(4).EQ.0) GO TO 5
      I=I+1
      VNORM(1)=VNORM(1)+COFB(I)*YPTS(L)
      VNORM(2)=VNORM(2)+COFB(I)*XPTS(L)
      IF(I.EQ.NCOFS) GO TO 10
    5 IF(IFIT(5).EQ.0) GO TO 6
      I=I+1
      VNORM(1)=VNORM(1)+COFB(I)*ZPTS(L)
      VNORM(3)=VNORM(3)+COFB(I)*XPTS(L)
      IF(I.EQ.NCOFS) GO TO 10
    6 IF(IFIT(6).EQ.0) GO TO 7
      I=I+1
      VNORM(2)=VNORM(2)+COFB(I)*ZPTS(L)
      VNORM(3)=VNORM(3)+COFB(I)*YPTS(L)
      IF(I.EQ.NCOFS) GO TO 10
    7 IF(IFIT(7).EQ.0) GO TO 8
      I=I+1
      VNORM(1)=VNORM(1)+2.*COFB(I)*XPTS(L)
      IF(I.EQ.NCOFS) GO TO 10
    8 IF(IFIT(8).EQ.0) GO TO 9
      I=I+1
      VNORM(2)=VNORM(2)+2.*COFB(I)*YPTS(L)
      IF(I.EQ.NCOFS) GO TO 10
    9 IF(IFIT(9).EQ.0) GO TO 10
      I=I+1
      VNORM(3)=VNORM(3)+2.*COFB(I)*ZPTS(L)
```

```
   10 VMAG=DSQRT(VNORM(1)*VNORM(1)+VNORM(2)*VNORM(2)+VNORM(3)*
     1 VNORM(3))
      IF(VMAG.EQ.0) GO TO 1000
      DO 11 I=1,3
   11 VNORM(I)=VNORM(I)/VMAG
      DO 12 I=1,3
   12 COSANG=COSANG+VNORM(I)*XVECT(I)
   20 CONTINUE
      IF(COSANG.EQ.0) GO TO 2000
      IF(COSANG.GT.0) RETURN
      DO 28 J=1,NCOFS
   28 COFB(J)=-COFB(J)
      DET=-DET
      RETURN
 1000 WRITE(6,200)
  200 FORMAT(1H1,'MAGNITUDE OF NORMAL VECTOR IS ZERO IN SIGNF')
      STOP
 2000 WRITE(6,201)
  201 FORMAT(1H0,'WARNING TEST IN SIGNF SHOWS VECTORS PERPENDICULAR')
      RETURN
      END
```

```
      SUBROUTINE EQNSOL(A,B,N,X,DET,NHOMO)
      IMPLICIT REAL*8 (A-H,O-S,U-Z)
      REAL*8 TOL
      DIMENSION A(9,9),B(1),X(1)
      COMMON/TOLRS/TOLEQN,TOLSNT,TOLQPT,TOLINT,TOLCK1,TOLCK2,
     1 TOLCK4,TDELT,TOLCIR,TANGS2,TOLPLT
      TOL=TOLEQN
      NRANK=N
      DO 10 I=1,N
   10 X(I)=0.0
      I=0
      ICOL=0
   12 I=I+1
      ICOL=ICOL+1
      IP1=I+1
   14 AMAXI=A(I,ICOL)
      L=I
      IF(IP1.GT.N) GO TO 150
      DO 15 K=IP1,N
      IF(DABS(A(K,ICOL)).GT.DABS(AMAXI)) L=K
   15 AMAXI=A(L,ICOL)
  150 IF(DABS(AMAXI).GT.TOL) GO TO 16
      X(ICOL)=1.0
      NRANK=NRANK-1
      IF(ICOL.EQ.N) GO TO 45
      ICOL=ICOL+1
      GO TO 14
   16 IF(L.EQ.I) GO TO 25
      DO 20 J=1,N
      SWAP=A(I,J)
      A(I,J)=A(L,J)
   20 A(L,J)=SWAP
      SWAP=B(I)
      B(I)=B(L)
      B(L)=SWAP
   25 XDIV=A(I,ICOL)
      DO 30 J=ICOL,N
   30 A(I,J)=A(I,J)/XDIV
      B(I)=B(I)/XDIV
      IF(IP1.GT.N) GO TO 42
      DO 40 K=IP1,N
      XMUL=A(K,ICOL)
      DO 35 J=ICOL,N
   35 A(K,J)=A(K,J)-XMUL*A(I,J)
   40 B(K)=B(K)-XMUL*B(I)
      IF(ICOL.LT.N) GO TO 12
   42 IF(NRANK.EQ.N.OR.NHOMO.EQ.0) X(ICOL)=B(I)/A(I,ICOL)
   45 IJUMP=ICOL-I
      DO 50 I=2,N
      K=N-I+1
      IF(X(K).EQ.0.0) GO TO 47
      IJUMP=IJUMP-1
```

```
      GO TO 50
   47 IF(NRANK.EQ.N.OR.NHOMO.EQ.0) X(K)=B(K)
      KP1=K+1
      DO 48 J=KP1,N
   48 X(K)=X(K)-A(K-IJUMP,J)*X(J)
   50 CONTINUE
      DET=1.0
      IF(NRANK.LT.N) DET=0.0
      RETURN
      END
```

```
      SUBROUTINE CFITS(DATAC,DATAS,ISTART,NPTS,COEFSB,ICOF,SIG,XCURF,
     1 FCURF)
      DIMENSION DATAC(1),DATAS(1),COEFSB(1),IFIT(9)
      DIMENSION SIGMA(8),DETERM(8)
      REAL*8 XCURF(1),FCURF(1),COFB(9),SIG,DET
      REAL*8 XPTS(30),YPTS(30),ZPTS(30)
      IDEFLT=DATAC(1)+0.5
      IPASS=0
      CALL NORM(DATAS,ISTART,NPTS,TNORM)
      L=ISTART-21
      DO 5 I=1,9
    5 IFIT(I)=DATAS(L+I)+0.5
      IF(IDEFLT.EQ.0) GO TO 8
      DO 6 I=1,3
    6 IFIT(I)=1
    8 CONTINUE
      NCOEFS=0
      DO 10 I=1,9
   10 IF(IFIT(I).EQ.1) NCOEFS=NCOEFS+1
      IF(NPTS.LT.NCOEFS) GO TO 50
   15 CONTINUE
      IPASS=IPASS+1
      DO 35 L=1,NPTS
      LJ=(L-1)*NCOEFS
      IJ=(L-1)*3+ISTART
      XV=DATAS(IJ)/TNORM
      YV=DATAS(IJ+1)/TNORM
      ZV=DATAS(IJ+2)/TNORM
      XPTS(L)=XV
      YPTS(L)=YV
      ZPTS(L)=ZV
      I=0
      IF(IFIT(1).EQ.0) GO TO 310
      I=I+1
      XCURF(LJ+I)=XV
  310 IF(IFIT(2).EQ.0) GO TO 311
      I=I+1
      XCURF(LJ+I)=YV
  311 IF(IFIT(3).EQ.0) GO TO 312
      I=I+1
      XCURF(LJ+I)=ZV
  312 IF(IFIT(4).EQ.0) GO TO 313
      I=I+1
      XCURF(LJ+I)=XV*YV
  313 IF(IFIT(5).EQ.0) GO TO 314
      I=I+1
      XCURF(LJ+I)=XV*ZV
  314 IF(IFIT(6).EQ.0) GO TO 315
      I=I+1
      XCURF(LJ+I)=YV*ZV
  315 IF(IFIT(7).EQ.0) GO TO 316
      I=I+1
```

```
      XCURF(LJ+I)=XV*XV
  316 IF(IFIT(8).EQ.0) GO TO 317
      I=I+1
      XCURF(LJ+I)=YV*YV
  317 IF(IFIT(9).EQ.0) GO TO 35
      I=I+1
      XCURF(LJ+I)=ZV*ZV
   35 FCURF(L)=1.
      CALL CURFIT(FCURF,XCURF,NCOEFS,NPTS,COFB,DET,SIG,1)
      CALL SIGNF(COFB,NCOEFS,DET,XPTS,YPTS,ZPTS,NPTS,IFIT)
      IF(IDEFLT.EQ.0) GO TO 350
      IF(IPASS.EQ.9) GO TO 350
      SIGMA(IPASS)=SIG
      DETERM(IPASS)=DET
      GO TO (318,319,320,321,322,323,324,325), IPASS
  318 IF(NPTS.LE.3) GO TO 350
      NCOEFS=4
      IFIT(7)=1
      GO TO 15
  319 IFIT(7)=0
      IFIT(8)=1
      GO TO 15
  320 IFIT(8)=0
      IFIT(9)=1
      GO TO 15
  321 IF(NPTS.LE.4) GO TO 325
      NCOEFS=5
      IFIT(7)=1
      IFIT(8)=1
      IFIT(9)=0
      GO TO 15
  322 IFIT(8)=0
      IFIT(9)=1
      GO TO 15
  323 IFIT(7)=0
      IFIT(8)=1
      GO TO 15
  324 IF(NPTS.LE.5) GO TO 325
      NCOEFS=6
      IFIT(7)=1
      GO TO 15
  325 IMATCH=0
 3250 SIG=SIGMA(1)
      L=1
      NCOEFS=8
      IF(NPTS.EQ.4) NCOEFS=4
      IF(NPTS.EQ.5) NCOEFS=7
      DO 326 I=2,NCOEFS
      IF(ABS(DETERM(I)).LT.0.5.AND.IMATCH.EQ.0) GO TO 326
      IF(SIGMA(I).LT.SIG) L=I
      IF(L.EQ.I) SIG=SIGMA(I)
  326 CONTINUE
```

```
      IF(IMATCH.EQ.0.AND.SIG.LT.1.0D-08) GO TO 327
      IF(IMATCH.EQ.1.AND.SIG.LT.1.0D-06) GO TO 327
      IF(IMATCH.EQ.1) GO TO 60
      IMATCH=1
      GO TO 3250
  327 IFIT(7)=0
      IFIT(8)=0
      IFIT(9)=0
      NCOEFS=3
      IF(L.GT.1) NCOEFS=4
      IF(L.GT.4) NCOEFS=5
      IF(L.EQ.8) NCOEFS=6
      IPASS=8
      GO TO (15,328,329,330,331,332,333,334), L
  328 IFIT(7)=1
      GO TO 15
  329 IFIT(8)=1
      GO TO 15
  330 IFIT(9)=1
      GO TO 15
  331 IFIT(7)=1
      IFIT(8)=1
      GO TO 15
  332 IFIT(7)=1
      IFIT(9)=1
      GO TO 15
  333 IFIT(8)=1
      IFIT(9)=1
      GO TO 15
  334 IFIT(7)=1
      IFIT(8)=1
      IFIT(9)=1
      GO TO 15
  350 CONTINUE
      L=(ICOF-1)*10
      J=0
      DO 40 I=1,10
      COEFSB(L+I)=0.
      IF(I.EQ.10) GO TO 36
      IF(IFIT(I).EQ.0) GO TO 40
      J=J+1
   36 COEFSB(L+I)=DATAS(ISTART+I-12)
      IF(COEFSB(L+I).NE.0.) GO TO 40
      IF(I.EQ.10) GO TO 38
      COEFSB(L+I)=COFB(J)/TNORM
      IF(I.LE.3) GO TO 40
      COEFSB(L+I)=COEFSB(L+I)/TNORM
      GO TO 40
   38 COEFSB(L+I)=-DET
   40 CONTINUE
      RETURN
   50 WRITE(6,100) ICOF
```

```
100  FORMAT(1H1,'REFLECTIVE SURFACE NO.',I3,'  HAS NOT BEEN DEFINED BY
    1ENOUGH POINTS')
     STOP
 60  WRITE(6,110) ICSF
110  FORMAT(1H1,'BOUNDARY POINTS FOR REFLECTIVE SURFACE NO. ',I3,
    1 '  DO NOT FORM A CURVE-FIT WITHIN ERROR TOLERANCE'/
    2 1H0,'PROGRAM WILL CONTINUE WITH BEST FIT POSSIBLE')
     GO TO 327
     END
```

```
      SUBROUTINE OUTPT2(COEFB,SIG,NSETS,TITLES,LOOP)
      DIMENSION COEFB(1),TITLES(1),SIG(1)
      WRITE(6,102) (TITLES(MM),MM=1,80)
  102 FORMAT(1H1,80A1)
      WRITE(6,103)
  103 FORMAT(1H0,46X,'*** RESULTS OF CURVE-FIT ANALYSIS ***')
      GO TO (10,50), LOOP
   10 CONTINUE
      WRITE(6,110)
  110 FORMAT(1H0,2X,'**FENCE DATA')
      LINES=5
      DO 20 I=1,NSETS
      LL=(I-1)*4
      IF((LINES+6).LE.50) GO TO 15
      WRITE(6,102) (TITLES(MM),MM=1,80)
      WRITE(6,103)
      WRITE(6,110)
      LINES=5
   15 WRITE(6,112) I
  112 FORMAT(1H0,5X,'*FENCE NO.',I3)
      LINES=LINES+2
      WRITE(6,121) (COEFB(LL+L),L=1,4)
  121 FORMAT(1H0,9X,'VALUES FOR COEFFICIENTS OF SURFACE'/1H ,11X,
     1 '(1) X    COEF ',E12.4,5X,'(2) Y    COEF ',E12.4,5X,'(3) Z    COEF '
     2,E12.4,5X,'(4) CONSTANT ',E12.4)
      WRITE(6,123) SIG(I)
  123 FORMAT(1H0,9X,'ROOT MEAN SQUARE ERROR OF FIT=',E12.4)
      LINES=LINES+5
   20 CONTINUE
      RETURN
   50 CONTINUE
      WRITE(6,117)
  117 FORMAT(1H0,2X,'**REFLECTIVE SURFACE DATA')
      LINES=5
      LT=0
      DO 60 I=1,NSETS
      LT=LT+80
      LL=(I-1)*10
      IF((LINES+9).LE.50) GO TO 55
      WRITE(6,102) (TITLES(MM),MM=1,80)
      WRITE(6,103)
      WRITE(6,117)
      LINES=5
   55 WRITE(6,118) I,(TITLES(LT+MM),MM=1,80)
  118 FORMAT(1H0,5X,'*REFLECTIVE SURFACE NO.',I3,5X,'IDENTIFICATION: ',
     1 80A1)
      LINES=LINES+2
      WRITE(6,122) (COEFB(LL+L),L=1,10)
  122 FORMAT(1H0,9X,'VALUES FOR COEFFICIENTS OF SURFACE'/1H ,11X,'(1) X
     1  COEF ',E12.4,5X,'(2) Y    COEF ',E12.4,5X,'(3) Z    COEF ',E12.4/
     2 1H ,11X,'(4) XY  COEF ',E12.4,5X,'(5) XZ  COEF ',E12.4,5X,
     3 '(6) YZ  COEF ',E12.4/1H ,11X,'(7) XSQ COEF ',E12.4,5X,
```

```
      4 '(8) YSQ COEF ',E12.4,5X,'(9) ZSQ COEF ',E12.4/1H ,10X,
      5 '(10) CONSTANT ',E12.4)
        WRITE(6,123) SIG(I)
        LINES=LINES+8
   60   CONTINUE
        RETURN
        END
```

```
      SUBROUTINE GLINT(DATAC,DATAS,MS,COEFSB,GAMMA,ALPHA2,BETA2,INTRFL,
     1 ISHADW,INTERF,DWORKS,DATAF,MF)
      DIMENSION ALPHA2(1),BETA2(1),INTRFL(1),ISHADW(1),INTERF(1)
      DIMENSION DATAC(1),DATAS(1),MS(1),COEFSB(1)
      DIMENSION DWORKS(1),DATAF(1),MF(1)
      DIMENSION SUN(3),DIRCOS(3,3),XB(3),SUNB(3),VNORMB(3),X(3),
     1 RFLTNB(3),RFLTN(3)
      DATA ONE,ZERO,RAD/1.0E00,0.0E00,57.29578E00/
      SUN(1)=-COS(GAMMA/RAD)
      SUN(2)=0.
      SUN(3)=-SIN(GAMMA/RAD)
      DQ2=-DATAC(15)*DATAC(15)*144.
      THETA=DATAC(4)
      PHI=DATAC(5)
      SNTH=SIN(THETA/RAD)
      CSTH=COS(THETA/RAD)
      SNPH=SIN(PHI/RAD)
      CSPH=COS(PHI/RAD)
      SPST=SNPH*SNTH
      SPCT=SNPH*CSTH
      CPST=CSPH*SNTH
      CPCT=CSPH*CSTH
      DIRCOS(1,3)=-SNTH
      DIRCOS(2,3)=-SPCT
      DIRCOS(3,3)=CPCT
      DPSI=DATAC(11)
      NPSI=DATAC(9)+0.5
      NFENCE=DATAC(22)+0.5
      NPANEL=DATAC(23)+0.5
      MAS=0
      DO 100 I=1,NPANEL
      N10=(I-1)*10
      KI=MS(I)
      NPTS=DATAS(KI)+0.5
      PSIKP=DATAC(10)-DPSI
      DO 60 J=1,NPSI
      PSIKP=PSIKP+DPSI
      PSI=PSIKP
      IF(PSIKP.LT.-179.) PSI=-179.
      IF(PSIKP.GT.179.) PSI=179.
      IF(PSIKP.GT.-91.AND.PSIKP.LT.-89.) PSI=-89.
      IF(PSIKP.LT.91.AND.PSIKP.GT.89.) PSI=89.
      SNPS=SIN(PSI/RAD)
      CSPS=COS(PSI/RAD)
      DIRCOS(1,1)=-CSTH*CSPS
      DIRCOS(1,2)=-CSTH*SNPS
      DIRCOS(2,1)=SPST*CSPS-SNPS*CSPH
      DIRCOS(2,2)=SPST*SNPS+CSPS*CSPH
      DIRCOS(3,1)=-CPST*CSPS-SNPS*SNPH
      DIRCOS(3,2)=-CPST*SNPS+SNPH*CSPS
      DO 20 M=1,3
      SUNB(M)=0.
```

```
      DO 20 K=1,3
   20 SUNB(M)=SUNB(M)+DIRCOS(M,K)*SUN(K)
      DO 75 L=1,NPTS
      MAS=MAS+1
      INTRFL(MAS)=0
      ISHADW(MAS)=0
      INTERF(MAS)=0
      N3=(L-1)*3+KI
      DO 10 M=1,3
   10 XB(M)=DATAS(N3+M)
      IF(NFENCE.GT.0) CALL SHADOW(DATAF,MF,NFENCE,XB,SUNB,ISHADW,
     1 MAS,DWORKS)
      VNORMB(1)=COEFSB(N10+1)+COEFSB(N10+4)*XB(2)+COEFSB(N10+5)*XB(3)+
     1 2.*COEFSB(N10+7)*XB(1)
      VNORMB(2)=COEFSB(N10+2)+COEFSB(N10+4)*XB(1)+COEFSB(N10+6)*XB(3)+
     1 2.*COEFSB(N10+8)*XB(2)
      VNORMB(3)=COEFSB(N10+3)+COEFSB(N10+5)*XB(1)+COEFSB(N10+6)*XB(2)+
     1 2.*COEFSB(N10+9)*XB(3)
      ASN=0.
      ABSNSQ=0.
      DO 30 M=1,3
      ASN=ASN+SUNB(M)*VNORMB(M)
   30 ABSNSG=ABSNSG+VNORMB(M)**2
      ASN=ASN/SQRT(ABSNSG)
      IF(ASN.GT.0.001745) INTRFL(MAS)=1
      DO 40 M=1,3
   40 RFLTNB(M)=SUNB(M)-2.*ASN*VNORMB(M)/SQRT(ABSNSQ)
      IF(NFENCE.GT.0) CALL INTFER(DATAF,MF,NFENCE,XB,RFLTNB,INTERF,
     1 MAS,DWORKS)
      DO 50 M=1,3
      RFLTN(M)=0.
      X(M)=0.
      DO 50 K=1,3
      RFLTN(M)=RFLTN(M)+DIRCOS(K,M)*RFLTNB(K)
   50 X(M)=X(M)+DIRCOS(K,M)*XB(K)
      CALL QUADPT(ONE,ONE,ZERO,ZERO,ZERO,ZERO,ZERO,ZERO,ZERO,DQ2,
     1 RFLTN(1),RFLTN(2),RFLTN(3),X(1),X(2),X(3),XI1,YI1,ZI1,XI2,
     2 YI2,ZI2,INTC)
      IF(INTC.EQ.1) GO TO 55
      CALL SORNOT(RFLTN(1),RFLTN(2),RFLTN(3),X(1),X(2),X(3),XI1,YI1,ZI1,
     1 ISHAD)
      IF(ISHAD.EQ.1) GO TO 55
      XI1=XI2
      YI1=YI2
      ZI1=ZI2
   55 CONTINUE
      ALPHA2(MAS)=RAD*ATAN2(ZI1,SQRT(XI1*XI1+YI1*YI1))
      BETA2(MAS)=RAD*ATAN2(YI1,XI1)
   75 CONTINUE
   60 CONTINUE
  100 CONTINUE
      RETURN
```

```
      END                                                     00008840
```

```
      SUBROUTINE SHADOW(DATAF,MF,NFENCE,XBS,SUNB,ISHADW,MAS,DWORKS)
      DIMENSION DATAF(1),MF(1),XBS(1),SUNB(1),ISHADW(1),DWORKS(1),XBF(3)
      APL=-SUNB(1)
      BPL=-SUNB(2)
      CPL=-SUNB(3)
      DPL=-APL*XBS(1)-BPL*XBS(2)-CPL*XBS(3)
      THETA=0.
      IF(APL.NE.0.0.OR.CPL.NE.0.0) THETA=ATAN2(APL,CPL)
      ALPHA=ATAN2(BPL,SQRT(APL*APL+CPL*CPL))
      SNTH=SIN(THETA)
      CSTH=COS(THETA)
      SNAL=SIN(ALPHA)
      CSAL=COS(ALPHA)
      SAST=SNAL*SNTH
      SACT=SNAL*CSTH
      CAST=CSAL*SNTH
      CACT=CSAL*CSTH
      DO 50 I=1,NFENCE
      KF=MF(I)
      NPTSF=DATAF(KF)+0.5
      DO 30 J=1,NPTSF
      LI=(J-1)*3
      LK=(J-1)*2
      DO 10 K=1,3
   10 XBF(K)=DATAF(LI+K+1)
      CALL PLANPT(APL,BPL,CPL,DPL,SUNB(1),SUNB(2),SUNB(3),DISC,XBF(1),
     1 XBF(2),XBF(3),XINTP,YINTP,ZINTP)
      CALL SORNOT(SUNB(1),SUNB(2),SUNB(3),XBF(1),XBF(2),XBF(3),XINTP,
     1 YINTP,ZINTP,ISH)
      IF(ISH.EQ.0) GO TO 50
   20 DWORKS(LK+1)=XINTP*CSTH-ZINTP*SNTH
      DWORKS(LK+2)=-XINTP*SAST+YINTP*CSAL-ZINTP*SACT
   30 CONTINUE
      XC=XBS(1)*CSTH-XBS(3)*SNTH
      YC=-XBS(1)*SAST+XBS(2)*CSAL-XBS(3)*SACT
      CALL CIRCLE(DWORKS,NPTSF,XC,YC,INCR)
      IF(INCR.EQ.0) GO TO 50
      ISHADW(MAS)=1
      GO TO 60
   50 CONTINUE
   60 RETURN
      END
```

```
      SUBROUTINE PLANPT(A,B,C,D,SL,SM,SN,DISC,X1,Y1,Z1,X,Y,Z)
      COMMON/TOLRS/TOLEQN,TOLSNT,TOLQPT,TOLINT,TOLCK1,TOLCK2,
     1 TOLCK4,DELT,TOLCIR,ANGST2,TOL
      IF(ABS(SL).GE.ABS(SN).AND.ABS(SL).GE.ABS(SM)) DISC=A+B*SM/SL+
     1 C*SN/SL
      IF(ABS(SL).LT.ABS(SN).AND.ABS(SM).LE.ABS(SN)) DISC=A*SL/SN+
     1 B*SM/SN+C
      IF(ABS(SL).LT.ABS(SM).AND.ABS(SN).LT.ABS(SM)) DISC=A*SL/SM+
     1 B+C*SN/SM
      IF(ABS(DISC).LT.TOL) RETURN
      IF(ABS(SL).LT.ABS(SN).AND.ABS(SM).LE.ABS(SN)) GO TO 10
      IF(ABS(SL).LT.ABS(SM).AND.ABS(SN).LT.ABS(SM)) GO TO 20
      X=(-D-B*Y1+B*X1*SM/SL-C*Z1+C*X1*SN/SL)/DISC
      Y=Y1+SM*(X-X1)/SL
      Z=Z1+SN*(X-X1)/SL
      RETURN
   10 Z=(-D-A*X1+A*Z1*SL/SN-B*Y1+B*Z1*SM/SN)/DISC
      X=X1+SL*(Z-Z1)/SN
      Y=Y1+SM*(Z-Z1)/SN
      RETURN
   20 Y=(-D-A*X1+A*SL*Y1/SM-C*Z1+C*SN*Y1/SM)/(A*SL/SM+B+C*SN/SM)
      X=X1+SL*(Y-Y1)/SM
      Z=Z1+SN*(Y-Y1)/SM
      RETURN
      END
```

```
      SUBROUTINE SORNOT(SL,SM,SN,X1,Y1,Z1,X,Y,Z,ISHAD)
      COMMON/TOLRS/TOLEQN,TOL,TOLQPT,TOLINT,TOLCK1,TOLCK2,
     1 TOLCK4,DELT,TOLCIR,ANGST2,TOLPLT
      ISHAD=2
      SL1=X-X1
      SM1=Y-Y1
      SN1=Z-Z1
      IF((ABS(SL1)+ABS(SM1)+ABS(SN1)).LT.TOL) RETURN
      DIR=0.0
      IF(ABS(SL).GT.TOL) DIR=SL1/SL
      IF(ABS(SM).GT.TOL) DIR=DIR+SM1/SM
      IF(ABS(SN).GT.TOL) DIR=DIR+SN1/SN
      ISHAD=1
      IF(DIR.LT.0.0) ISHAD=0
      RETURN
      END
```

```
      SUBROUTINE INTFER(DATAF,MF,NFENCE,XBS,RFLTNB,INTERF,MAS,DWORKS)
      DIMENSION DATAF(1),MF(1),XBS(1),RFLTNB(1),INTERF(1),DWORKS(1),
     1 XBF(3)
      APL=-RFLTNB(1)
      BPL=-RFLTNB(2)
      CPL=-RFLTNB(3)
      DPL=-APL*XBS(1)-BPL*XBS(2)-CPL*XBS(3)
      THETA=0.
      IF(APL.NE.0.0.OR.CPL.NE.0.0) THETA=ATAN2(APL,CPL)
      ALPHA=ATAN2(BPL,SQRT(APL*APL+CPL*CPL))
      SNTH=SIN(THETA)
      CSTH=COS(THETA)
      SNAL=SIN(ALPHA)
      CSAL=COS(ALPHA)
      SAST=SNAL*SNTH
      SACT=SNAL*CSTH
      CAST=CSAL*SNTH
      CACT=CSAL*CSTH
      DO 50 I=1,NFENCE
      KF=MF(I)
      NPTSF=DATAF(KF)+0.5
      DO 30 J=1,NPTSF
      LI=(J-1)*3
      LK=(J-1)*2
      DO 10 K=1,3
   10 XBF(K)=DATAF(LI+K+1)
      CALL PLANPT(APL,BPL,CPL,DPL,RFLTNB(1),RFLTNB(2),RFLTNB(3),DISC,
     1 XBF(1),XBF(2),XBF(3),XINTP,YINTP,ZINTP)
      CALL SORNOT(RFLTNB(1),RFLTNB(2),RFLTNB(3),XBF(1),XBF(2),XBF(3),
     1 XINTP,YINTP,ZINTP,ISH)
      IF(ISH.EQ.1) GO TO 50
   20 DWORKS(LK+1)=XINTP*CSTH-ZINTP*SNTH
      DWORKS(LK+2)=-XINTP*SAST+YINTP*CSAL-ZINTP*SACT
   30 CONTINUE
      XC=XBS(1)*CSTH-XBS(3)*SNTH
      YC=-XBS(1)*SAST+XBS(2)*CSAL-XBS(3)*SACT
      CALL CIRCLE(DWORKS,NPTSF,XC,YC,INCR)
      IF(INCR.EQ.0) GO TO 50
      INTERF(MAS)=1
      GO TO 60
   50 CONTINUE
   60 RETURN
      END
```

```
      SUBROUTINE QUADPT(A,B,C,D,E,F,G,H,CK,CL,SL,SM,SN,X1,Y1,Z1,XI1,YI1,
     1 ZI1,XI2,YI2,ZI2,INTC)
      COMMON/TOLRS/TOLEQN,TOLSNT,TOL,TOLINT,TOLCK1,TOLCK2,
     1 TOLCK4,DELT,TOLCIR,ANGST2,TOLPLT
      INTC=0
      IF(ABS(SL).LT.ABS(SN).AND.ABS(SM).LE.ABS(SN)) GO TO 30
      IF(ABS(SL).LT.ABS(SM).AND.ABS(SN).LT.ABS(SM)) GO TO 50
      SA=A+B*(SM/SL)**2+C*(SN/SL)**2+D*SM/SL+F*SM*SN/SL**2+E*SN/SL
      SB=2.*B*Y1*SM/SL-2.*B*X1*(SM/SL)**2+2.*C*Z1*SN/SL-2.*C*X1*
     1 (SN/SL)**2+D*Y1-D*X1*SM/SL+E*Z1-E*X1*SN/SL+F*Z1*SM/SL-F*X1*SM*
     2 SN/SL**2+F*Y1*SN/SL-F*X1*SM*SN/SL**2+G+H*SM/SL+CK*SN/SL
      SC=B*Y1*Y1+B*X1*X1*(SM/SL)**2+C*Z1*Z1-2.*B*Y1*X1*SM/SL+C*X1*X1*
     1 (SN/SL)**2-2.*C*X1*Z1*SN/SL+F*Y1*Z1-F*X1*Y1*SN/SL-F*X1*Z1*SM/SL+
     2 F*X1*X1*SM*SN/SL**2+H*Y1-H*X1*SM/SL+CK*Z1-CK*X1*SN/SL+CL
      ICONTR=1
    5 DISC=SB*SB-4.*SA*SC
      IF(DISC.LT. ABS(SA)/10.) RETURN
      IF(DISC.LT.0.0) RETURN
      IF(ABS(SA).GE.TOL) GO TO 10
      IF(ABS(SB).LT.TOL) RETURN
      XI1=-SC/SB
      INTC=1
      IF(ICONTR.EQ.2) GO TO 60
      IF(ICONTR.EQ.3) GO TO 40
      GO TO 20
   10 XI1=-SB/SA/2.+SQRT(DISC)/SA/2.
      XI2=-SB/SA/2.-SQRT(DISC)/SA/2.
      INTC=2
      IF(ICONTR.EQ.2) GO TO 60
      IF(ICONTR.EQ.3) GO TO 40
   20 YI1=Y1+SM*(XI1-X1)/SL
      ZI1=Z1+SN*(XI1-X1)/SL
      IF(INTC.EQ.1) RETURN
      YI2=Y1+SM*(XI2-X1)/SL
      ZI2=Z1+SN*(XI2-X1)/SL
      RETURN
   30 SA=C+B*(SM/SN)**2+A*(SL/SN)**2+F*SM/SN+E*SL/SN+D*SM*SL/SN**2
      SB=2.*B*Y1*SM/SN-2.*B*Z1*(SM/SN)**2+2.*A*X1*SL/SN-2.*A*Z1*
     1 (SL/SN)**2+F*Y1-F*Z1*SM/SN+E*X1-E*Z1*SL/SN+D*X1*SM/SN-D*Z1*SM*
     2 SL/SN**2+D*Y1*SL/SN-D*Z1*SM*SL/SN**2+CK+H*SM/SN+G*SL/SN
      SC=B*Y1*Y1+B*Z1*Z1*(SM/SN)**2-2.*B*Y1*Z1*SM/SN+A*X1*X1+A*Z1*Z1*
     1 (SL/SN)**2-2.*A*X1*Z1*SL/SN+D*Y1*X1-D*Y1*Z1*SL/SN-D*X1*Z1*SM/SN+
     2 D*Z1*Z1*SM*SL/SN**2+H*Y1-H*Z1*SM/SN+G*X1-G*Z1*SL/SN+CL
      ICONTR=3
      GO TO 5
   40 ZI1=XI1
      YI1=Y1+SM*(ZI1-Z1)/SN
      XI1=X1+SL*(ZI1-Z1)/SN
      IF(INTC.EQ.1) RETURN
      ZI2=XI2
      YI2=Y1+SM*(ZI2-Z1)/SN
      XI2=X1+SL*(ZI2-Z1)/SN
```

```
      RETURN
   50 SA=B+A*(SL/SM)**2+C*(SN/SM)**2+D*SL/SM+E*SL*SN/SM**2+F*SN/SM
      SB=2.*A*X1*SL/SM-2.*A*Y1*(SL/SM)**2+2.*C*Z1*SN/SM-2.*C*Y1*
     1 (SN/SM)**2+D*X1-D*Y1*SL/SM+E*X1*SN/SM+E*Z1*SL/SM-2.*E*Y1*SL*SN/
     2 SM**2+F*Z1-F*Y1*SN/SM+G*SL/SM+H+CK*SN/SM
      SC=A*X1*X1+A*Y1*Y1*(SL/SM)**2-2.*A*Y1*X1*SL/SM+C*Z1*Z1+C*Y1*Y1*
     1 (SN/SM)**2-2.*C*Y1*Z1*SN/SM+E*X1*Z1-E*X1*Y1*SN/SM-E*Y1*Z1*SL/SM+
     2 E*Y1*Y1*SL*SN/SM**2+G*X1-G*Y1*SL/SM+CK*Z1-CK*Y1*SN/SM+CL
      ICONTR=2
      GO TO 5
   60 YI1=XI1
      XI1=X1+SL*(YI1-Y1)/SM
      ZI1=Z1+SN*(YI1-Y1)/SM
      IF(INTC.EQ.1) RETURN
      YI2=XI2
      XI2=X1+SL*(YI2-Y1)/SM
      ZI2=Z1+SN*(YI2-Y1)/SM
      RETURN
      END
```

```
      SUBROUTINE OUTPT3(DATAC,DATAS,MS,TITLES,GAMMA,ALPHA2,BETA2,
     1 INTRFL,ISHADW,INTERF)
      DIMENSION INTRFL(1),ISHADW(1),INTERF(1)
      DIMENSION DATAC(1),DATAS(1),MS(1),ALPHA2(1),BETA2(1),TITLES(1)
      LT=0
      MAS=0
      NPSI=DATAC(9)+0.5
      DPSI=DATAC(11)
      NPANEL=DATAC(23)+0.5
      DO 90 I=1,NPANEL
      K=MS(I)
      NPTS=DATAS(K)+0.5
      WRITE(6,102) (TITLES(MM),MM=1,80)
      LT=LT+80
      WRITE(6,101) I,(TITLES(LT+MM),MM=1,80)
  102 FORMAT(1H1,80A1)
  101 FORMAT(1H0,51X,'*** SUN GLINT SIGNATURE ***'/1H0,5X,'REFLECTIVE SU
     1RFACE NO.',I3,5X,'IDENTIFICATION: ',80A1)
      WRITE(6,103) GAMMA,DATAC(12),DATAC(4),DATAC(13),DATAC(5),
     1 DATAC(14),DATAC(15)
  103 FORMAT(1H0,5X,'SUN ELEVATION',F12.2,76X,'XROT',F9.2/
     1 1H ,5X,'A/C PITCH ATTITUDE',F7.2,76X,'YROT',F9.2/1H ,5X,'A/C ROLL
     2 ATTITUDE',F8.2,76X,'ZROT',F9.2/1H ,106X,'DISTG',F8.2)
      WRITE(6,104)
  104 FORMAT(1H0, 5X,'A/C YAW',20X,'BOUNDARY POINTS -- BODY AXES', 7X,
     X 'STATUS FLAGS FOR POINTS',18X,
     1 'GLINT'/1H ,30X,'(STATIONLINE,BUTTLINE,WATERLINE)', 5X,
     Y 'INRFL',4X,'ISHAD',4X,'INTRF',11X,
     2 'AZIMUTH',3X,'ELEVATION'/1H ,36X,'X',9X,'Y',9X,'Z')
      LINES=13
      PSI=DATAC(10)-DPSI
      DO 60 J=1,NPSI
      PSI=PSI+DPSI
      DO 75 L=1,NPTS
      MAS=MAS+1
      N3=(L-1)*3+K
      XB=DATAS(N3+1)+DATAC(12)
      YB=DATAS(N3+2)+DATAC(13)
      ZB=DATAS(N3+3)+DATAC(14)
      WRITE(6,105) PSI,XB,YB,ZB,INTRFL(MAS),ISHADW(MAS),INTERF(MAS),
     1 BETA2(MAS),ALPHA2(MAS)
  105 FORMAT(1H0,5X,F7.2,19X,F8.2,2F10.2,10X,I1,8X,I1,8X,I1,13X,F7.2,
     1 4X,F6.2)
      LINES=LINES+2
   75 CONTINUE
   60 CONTINUE
   90 CONTINUE
      RETURN
      END
```

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      SUBROUTINE MINMAX(DATAC,DATAS,MS,ALPHA2,BETA2,APLOT,BPLOT,INTRFL,   00011310
     1 ISHADW,INTERF,IPLTOL)                                              00011320
      DIMENSION DATAC(1),DATAS(1),MS(1),ALPHA2(1),BETA2(1),               00011330
     1 APLOT(1),BPLOT(1),INTRFL(1),ISHADW(1),INTERF(1),IPLTOL(1)          00011340
      IRFLTN=DATAC(3)+0.5                                                 00011350
      NPANEL=DATAC(23)+0.5                                                00011360
      NPSI=DATAC(9)+0.5                                                   00011370
      NPSI4=4*(NPSI-1)+1                                                  00011380
      IST=1                                                               00011390
      MAS=0                                                               00011400
      LAS=0                                                               00011410
      DO 70 I=1,NPANEL                                                    00011440
      KN=MS(I)                                                            00011470
      NPTS=DATAS(KN)+0.5                                                  00011480
      DO 60 J=1,NPSI                                                      00011490
      NP=0                                                                00011500
      DO 50 L=1,NPTS                                                      00011510
      MAS=MAS+1                                                           00011520
      IF(INTRFL(MAS).NE.IRFLTN) GO TO 50                                  00011530
      IF(ISHADW(MAS).EQ.1) GO TO 50                                       00011540
      IF(INTERF(MAS).EQ.1) GO TO 50                                       00011550
      NP=NP+1                                                             00011560
      IF(NP.GT.1) GO TO 10                                                00011570
      BLOW=BETA2(MAS)                                                     00011580
      KBMIN=MAS                                                           00011590
      BHIGH=BLOW                                                          00011600
      KBMAX=MAS                                                           00011610
      ALOW=ALPHA2(MAS)                                                    00011620
      KAMIN=MAS                                                           00011630
      AHIGH=ALOW                                                          00011640
      KAMAX=MAS                                                           00011650
   10 IF(BETA2(MAS).GE.BLOW) GO TO 20                                     00011660
      BLOW=BETA2(MAS)                                                     00011670
      KBMIN=MAS                                                           00011680
   20 IF(BETA2(MAS).LE.BHIGH) GO TO 30                                    00011690
      BHIGH=BETA2(MAS)                                                    00011700
      KBMAX=MAS                                                           00011710
   30 IF(ALPHA2(MAS).GE.ALOW) GO TO 40                                    00011720
      ALOW=ALPHA2(MAS)                                                    00011730
      KAMIN=MAS                                                           00011740
   40 IF(ALPHA2(MAS).LE.AHIGH) GO TO 50                                   00011750
      AHIGH=ALPHA2(MAS)                                                   00011760
      KAMAX=MAS                                                           00011770
   50 CONTINUE                                                            00011780
      IF(NP.GT.0) GO TO 55                                                00011790
      AAVG=0.                                                             00011800
      BAVG=0.                                                             00011810
      DO 52 L=1,NPTS                                                      00011820
      M=MAS-L+1                                                           00011830
      BAVG=BAVG+BETA2(M)                                                  00011840
   52 AAVG=AAVG+ALPHA2(M)                                                 00011850
      AAVG=AAVG/NPTS                                                      00011860
```

```
      BAVG=BAVG/NPTS                                    00011870
      DO 54 L=1,4                                       00011880
      IPLTOL(LAS+L)=1                                   00011890
      APLOT(LAS+L)=AAVG                                 00011900
   54 BPLOT(LAS+L)=BAVG                                 00011910
      GO TO 58                                          00011920
   55 CONTINUE                                          00011930
      DO 56 L=1,4                                       00011940
   56 IPLTOL(LAS+L)=0                                   00011950
      APLOT(LAS+1)=AHIGH+0.25                           00011960
      BPLOT(LAS+1)=BETA2(KAMAX)                         00011970
      BPLOT(LAS+2)=BLOW-0.25                            00011980
      APLOT(LAS+2)=ALPHA2(KBMIN)                        00011990
      APLOT(LAS+3)=ALOW-0.25                            00012000
      BPLOT(LAS+3)=BETA2(KAMIN)                         00012010
      BPLOT(LAS+4)=BHIGH+0.25                           00012020
      APLOT(LAS+4)=ALPHA2(KBMAX)                        00012030
   58 LAS=LAS+4                                         00012040
   60 CONTINUE                                          00012050
      IST=NPSI4+4                                       00012080
      NPSI4=NPSI4+4*NPSI                                00012090
   70 CONTINUE                                          00012100
      RETURN                                            00012110
      END                                               00012120
```

```
      SUBROUTINE PROBL(DATAC,DATAS,MS,APLOT,BPLOT,XPLOT,YPLOT,DWORKS,
     1DWKSP2,VPROBL,IPLTOL)
      DIMENSION DATAC(1),DATAS(1),MS(1),APLOT(1),BPLOT(1),XPLOT(1),
     1 YPLOT(1),DWORKS(1),DWKSP2(1),IPLTOL(1)
      DIMENSION RPS(200),RPSN(200),SPS(200)
      DIMENSION RPSINP(500),NINP(20),RPSOUT(500),NOUT(20),RPSWK1(500),
     1 NWK1(20),RPSWK2(500),NWK2(20),RPSWK3(500),NWK3(20)
      ALOW=DATAC(16)
      AHIGH=DATAC(17)
      BETH=DATAC(19)
      BETL=DATAC(18)
      TAREA=(AHIGH-ALOW)*(BETH-BETL)
      NPANEL=DATAC(23)+0.5
      NPSI=DATAC(9)+0.5
      NCUMI=0
      NSURFI=0
      SWEEP=0.
      LASP=0
      LAS=0
      DO 18 I=1,NPANEL
      NPSIP=NPSI
      NPSIS=NPSI+1
      DO 8 J=1,NPSI
      IF(IPLTOL(LASP+1).EQ.0.AND.NPSIS.GT.NPSI) NPSIS=J
      IF(NPSIS.GT.NPSI) GO TO 8
      IF(NPSIP.LT.NPSI) GO TO 8
      IF(IPLTOL(LASP+1).EQ.1) NPSIP=J-1
    8 LASP=LASP+4
      DO 12 J=1,NPSI
      IF(J.LT.NPSIS) GO TO 12
      IF(J.GT.NPSIP) GO TO 12
      IF((NPSIP-NPSIS).EQ.0) GO TO 9
      IF(J.GT.NPSIS) GO TO 10
      BAVG1=BPLOT(LAS+4)+BPLOT(LAS+2)
      BAVG2=BPLOT(LAS+8)+BPLOT(LAS+6)
      XPLOT(1)=BPLOT(LAS+4)
      YPLOT(1)=APLOT(LAS+4)
      IF(BAVG1.GE.BAVG2) GO TO 10
    9 XPLOT(1)=BPLOT(LAS+2)
      YPLOT(1)=APLOT(LAS+2)
   10 LP=J-NPSIS+2
      XPLOT(LP)=BPLOT(LAS+1)
      YPLOT(LP)=APLOT(LAS+1)
      IF((NPSIP-NPSIS).EQ.0) GO TO 100
      IF(J.LT.NPSIP) GO TO 11
      BAVG1=BPLOT(LAS+4)+BPLOT(LAS+2)
      BAVG2=BPLOT(LAS)+BPLOT(LAS-2)
  100 XPLOT(LP+1)=BPLOT(LAS+4)
      YPLOT(LP+1)=APLOT(LAS+4)
      IF((NPSIP-NPSIS).EQ.0) GO TO 11
      IF(BAVG1.GE.BAVG2) GO TO 11
      XPLOT(LP+1)=BPLOT(LAS+2)
```

```
      YPLOT(LP+1)=APLOT(LAS+2)
   11 LP=2*(NPSIP-NPSIS+1)+3-(J-NPSIS+1)
      XPLOT(LP)=BPLOT(LAS+3)
      YPLOT(LP)=APLOT(LAS+3)
   12 LAS=LAS+4
      IF(NPSIS.GT.NPSI) GO TO 18
      NCFS=2*(NPSIP-NPSIS+1)+2
      CALL SORT2(XPLOT,YPLOT,NCFS,NCFS1,NCFS2,DWORKS,DWKSP2)
      IF(NCFS2.EQ.0) GO TO 16
      CALL SORT(YPLOT,XPLOT,NCFS1,BETH,BETL,DWKSP2)
      IF(NCFS1.EQ.0) GO TO 14
      CALL SORT(XPLOT,YPLOT,NCFS1,AHIGH,ALOW,DWKSP2)
      IF(NCFS1.EQ.0) GO TO 14
      CALL AREA(XPLOT,YPLOT,NCFS1,YINTG)
      SWEEP=SWEEP+YINTG
      NSURFI=NSURFI+1
      NINP(NSURFI)=NCFS1
      N2=2*NCFS1
      DO 13 L=1,NCFS1
      J2=(L-1)*2+1
      RPSINP(NCUMI+J2)=XPLOT(L)
   13 RPSINP(NCUMI+J2+1)=YPLOT(L)
      NCUMI=NCUMI+N2
   14 CONTINUE
      DO 15 KKK=1,NCFS2
      LML=(KKK-1)*2
      XPLOT(KKK)=DWORKS(LML+1)
   15 YPLOT(KKK)=DWORKS(LML+2)
      NCFS=NCFS2
   16 CALL SORT(YPLOT,XPLOT,NCFS,BETH,BETL,DWKSP2)
      IF(NCFS.EQ.0) GO TO 18
      CALL SORT(XPLOT,YPLOT,NCFS,AHIGH,ALOW,DWKSP2)
      IF(NCFS.EQ.0) GO TO 18
      CALL AREA(XPLOT,YPLOT,NCFS,YINTG)
      SWEEP=SWEEP+YINTG
      NSURFI=NSURFI+1
      NINP(NSURFI)=NCFS
      N2=2*NCFS
      DO 17 L=1,NCFS
      J2=(L-1)*2+1
      RPSINP(NCUMI+J2)=XPLOT(L)
   17 RPSINP(NCUMI+J2+1)=YPLOT(L)
      NCUMI=NCUMI+N2
   18 CONTINUE
      VPROBL=0.
      IF(NSURFI.EQ.0) RETURN
      NPTS=NINP(1)
      N2=2*NPTS
      DO 30 L=1,N2
   30 RPSOUT(L)=RPSINP(L)
      NOUT(1)=NPTS
      NSURFO=1
```

```
      NCUMO=N2
      IF(NSURFI.EQ.1) GO TO 85
      NCUMI=N2
      DO 80 I=2,NSURFI
      NR=NINP(I)
      N2=2*NR
      DO 40 L=1,N2
   40 RPSWK1(L)=RPSINP(L+NCUMI)
      NWK1(1)=NR
      NSWK1=1
      NCUMI=NCUMI+N2
      NSUM=0
      DO 70 K=1,NSURFO
      NS=NOUT(K)
      M2=2*NS
      DO 50 L=1,M2
   50 SPS(L)=RPSOUT(NSUM+L)
      NSUM=NSUM+M2
      NCUM1=0
      NCUM3=0
      NSWK3=0
      DO 62 J=1,NSWK1
      NR=NWK1(J)
      N2=2*NR
      DO 55 L=1,N2
   55 RPS(L)=RPSWK1(L+NCUM1)
      NCUM1=NCUM1+N2
      CALL OVRLAP(RPS,NR,SPS,NS,RPSWK2,NSWK2,NWK2,RPSN)
      IF(NSWK2.EQ.0) GO TO 80
      DO 550 NI=1,NSWK2
      NPTS=NWK2(NI)
      IF(NPTS.GT.50) GO TO 80
  550 CONTINUE
      NCUM2=0
      DO 60 NI=1,NSWK2
      NSWK3=NSWK3+1
      NPTS=NWK2(NI)
      NWK3(NSWK3)=NPTS
      N2=2*NPTS
      DO 56 L=1,N2
   56 RPSWK3(NCUM3+L)=RPSWK2(NCUM2+L)
      NCUM2=NCUM2+N2
      NCUM3=NCUM3+N2
   60 CONTINUE
   62 CONTINUE
      NSWK1=NSWK3
      NCUM1=0
      DO 68 J=1,NSWK1
      NPTS=NWK3(J)
      N2=2*NPTS
      NWK1(J)=NPTS
      DO 65 L=1,N2
```

```
   65 RPSWK1(NCUM1+L)=RPSWK3(NCUM1+L)
   68 NCUM1=NCUM1+N2
   70 CONTINUE
      NCUM1=0
      DO 74 J=1,NSWK1
      NPTS=NWK1(J)
      NOUT(NSURFO+J)=NPTS
      N2=2*NPTS
      DO 72 L=1,N2
   72 RPSOUT(NSUM+L)=RPSWK1(NCUM1+L)
      NCUM1=NCUM1+N2
      NSUM=NSUM+N2
   74 CONTINUE
      NSURFO=NSURFO+NSWK1
   80 CONTINUE
   85 CONTINUE
      NCUMO=0
      SWA2=0.
      DO 95 I=1,NSURFO
      NPTS=NOUT(I)
      N2=2*NPTS
      DO 93 L=1,NPTS
      L2=(L-1)*2+1
      XPLOT(L)=RPSOUT(NCUMO+L2)
   93 YPLOT(L)=RPSOUT(NCUMO+L2+1)
      CALL AREA(XPLOT,YPLOT,NPTS,YINTG)
      SWA2=SWA2+YINTG
   95 NCUMO=NCUMO+N2
      VPROBL=SWA2/TAREA
      IF(SWA2.GT.SWEEP) VPROBL=SWEEP/TAREA
      IF(VPROBL.LE.1.) RETURN
      WRITE(6,200)
  200 FORMAT(1H0,'WARNING PROGRAM HAD DIFFICULTY ACCOUNTING FOR',
     1' OVERLAP PROBABILITY GREATER THAN ONE, ONE ASSUMED')
      VPROBL=1.
      RETURN
      END
```

```
      SUBROUTINE OVRLAP(RPS,NR,SPS,NS,RPSIN,NRPLSN,NRPTSN,RPSN)
      DIMENSION RPS(1),SPS(1),RPSN(1),RPSIN(1),NRPTSN(1)
      CALL CHECK4(RPS,NR,SPS,NS)
      NRPLSN=0
      NSUM=0
      IR=1
      IR2=1
   16 XC=RPS(IR2)
      YC=RPS(IR2+1)
      NS2=2*NS
      CALL CIRCLE(SPS,NS,XC,YC,INCR)
      IF(INCR.NE.2) GO TO 17
      IF(IR.EQ.NR) GO TO 120
      IR=IR+1
      IR2=2*IR-1
      GO TO 16
   17 IFLAG=5
      IF(INCR.EQ.1) IFLAG=6
      NEXT=0
      IF(IFLAG.EQ.6) NRN=0
      IF(IFLAG.EQ.6) GO TO 25
      NRPLSN=NRPLSN+1
      NRN=1
      RPSN(1)=XC
      RPSN(2)=YC
      IFLAG=1
   25 IRP1=IR+1
      IF(IR.EQ.NR) IRP1=1
      IR2P1=2*IRP1-1
      IDOUBL=0
   30 X1=RPS(IR2)
      Y1=RPS(IR2+1)
   35 X2=RPS(IR2P1)
      Y2=RPS(IR2P1+1)
      CALL INTERC(SPS,NS,X1,Y1,X2,Y2,X,Y,KL,IFAULT,IDOUBL,
     1 XALSO,YALSO)
      IF(IFLAG.EQ.6.AND.IFAULT.EQ.0) GO TO 70
      IF(IFLAG.EQ.1.AND.IFAULT.EQ.0) GO TO 40
      IF(IFLAG.EQ.4.AND.IFAULT.EQ.0) GO TO 40
      IF(IFLAG.EQ.6) GO TO 38
      CALL CHECK1(X2,Y2,RPSN,NRN,ICHK)
      IF(ICHK.EQ.1) GO TO 90
      IFLAG=1
      NRN=NRN+1
      NRN2=2*NRN-1
      RPSN(NRN2)=X2
      RPSN(NRN2+1)=Y2
   38 IR=IRP1
      IR2=2*IR-1
      IF(IRP1.EQ.1.AND.IFLAG.EQ.6) GO TO 90
      IRP1=IR+1
      IF(IR.EQ.NR) IRP1=1
```

```
      IR2P1=2*IRP1-1
      IDOUBL=0
      GO TO 30
 40   IFLAG=2
      NEXT=IRP1
      XSEP=X
      YSEP=Y
      CALL CHECK1(X,Y,RPSN,NRN,ICHK)
      IF(ICHK.EQ.1) GO TO 90
      NRN=NRN+1
      NRN2=2*NRN-1
      RPSN(NRN2)=X
      RPSN(NRN2+1)=Y
      IS=KL
      IS2=2*IS-1
      ISP1=IS+1
      IF(IS.EQ.NS) ISP1=1
      IS2P1=2*ISP1-1
      IDOUBL=1
      XALSO=X
      YALSO=Y
      KDIR=0
 50   X1=SPS(IS2)
      Y1=SPS(IS2+1)
      X2=SPS(IS2P1)
      Y2=SPS(IS2P1+1)
      CALL INTERC(RPS,NR,X1,Y1,X2,Y2,X,Y,KL,IFAULT,IDOUBL,XALSO,YALSO)
      IF(IFLAG.EQ.2.AND.IFAULT.EQ.0) GO TO 75
      IF(IFLAG.EQ.3.AND.IFAULT.EQ.0) GO TO 75
      IF(IFLAG.EQ.3.AND.KDIR.EQ.1) GO TO 60
      IF(IFLAG.EQ.3) GO TO 56
      IF(IFLAG.EQ.7.AND.IFAULT.EQ.0) GO TO 75
      IF(IFLAG.EQ.7.AND.KDIR.EQ.1) GO TO 54
      CALL CIRCLE(RPS,NR,X1,Y1,INCR)
      IF(INCR.EQ.1) GO TO 56
      IF(IFLAG.EQ.1) GO TO 30
 54   CALL CIRCLE(RPS,NR,X2,Y2,INCR)
      IF(INCR.EQ.1) GO TO 60
      IF(IFLAG.EQ.7) IFLAG=1
      IF(IFLAG.EQ.1) GO TO 30
      IF(IFLAG.EQ.7) IFLAG=1
      IFLAG=7
      IDOUBL=1
      XALSO=X
      YALSO=Y
      IF(INCR.EQ.0) GO TO 58
      GO TO 68
 56   NRN=NRN+1
      NRN2=2*NRN-1
      RPSN(NRN2)=X1
      RPSN(NRN2+1)=Y1
      IDOUBL=0
```

```
      IFLAG=3
   58 ISP1=IS
      IS2P1=2*ISP1-1
      IS=IS-1
      IF(IS.EQ.0) IS=NS
      IS2=2*IS-1
      KDIR=-1
      GO TO 50
   60 NRN=NRN+1
      NRN2=2*NRN-1
      RPSN(NRN2)=X2
      RPSN(NRN2+1)=Y2
      IDOUBL=0
      IFLAG=3
   68 IS=ISP1
      IS2=2*IS-1
      ISP1=IS+1
      IF(IS.EQ.NS) ISP1=1
      IS2P1=2*ISP1-1
      KDIR=1
      GO TO 50
   70 IF(NRPLSN.EQ.0) GO TO 74
      CALL CHECK2(X,Y,RPSIN,NRPLSN,NRPTSN,ICHK2)
      IF(ICHK2.EQ.1) GO TO 120
   74 NRPLSN=NRPLSN+1
      GO TO 76
   75 CALL CHECK1(X,Y,RPSN,NRN,ICHK)
      IF(ICHK.EQ.1) GO TO 90
   76 NRN=NRN+1
      NRN2=2*NRN-1
      RPSN(NRN2)=X
      RPSN(NRN2+1)=Y
      X1=X
      Y1=Y
      IDOUBL=1
      XALSO=X
      YALSO=Y
      IF(IFLAG.EQ.6) IFLAG=1
      IF(IFLAG.EQ.1) GO TO 35
      IRP1=KL+1
      IF(KL.EQ.NR) IRP1=1
      IR2P1=2*IRP1-1
      IFLAG=4
      GO TO 35
   90 IF(NRN.EQ.0) GO TO 120
      IF(NRN.LE.2) NRPLSN=NRPLSN-1
      IF(NRN.LE.2) GO TO 120
      IF(NEXT.EQ.0) GO TO 100
      NRPTSN(NRPLSN)=NRN
      N2=2*NRN
      DO 95 I=1,N2
   95 RPSIN(I+NSUM)=RPSN(I)
```

```
      NSUM=NSUM+N2
      NRN=0
      X1=XSEP
      Y1=YSEP
      IFLAG=6
      IRP1=NEXT
      IR2P1=2*IRP1-1
      IDOUBL=1
      XALSO=XSEP
      YALSO=YSEP
      IF(NRPLSN.EQ.5) GO TO 120
      GO TO 35
  100 X1=SPS(1)
      Y1=SPS(2)
      CALL CIRCLE(RPSN,NRN,X1,Y1,INCR)
      IF(INCR.EQ.0) GO TO 110
      X1=RPSN(NRN2)
      Y1=RPSN(NRN2+1)
      CALL CLOSE(SPS,NS,X1,Y1,KN)
      X1=RPSN(1)
      Y1=RPSN(2)
      CALL CLOSE(SPS,NS,X1,Y1,K1)
      DO 103 KDIR=1,2
      K=KN
      IFACT=(-1)**(KDIR+1)
      DO 102 I=1,NS
      L=K+IFACT*(I-1)
      IF(L.GT.NS) L=1
      IF(L.LT.1) L=NS
      IF(L.EQ.1.AND.KDIR.EQ.1) K=2-I
      IF(L.EQ.NS.AND.KDIR.EQ.2) K=NS+I-1
      L2=2*L-1
      M=NRN+I
      M2=2*M-1
      RPSN(M2)=SPS(L2)
      RPSN(M2+1)=SPS(L2+1)
      IF(L.EQ.K1) GO TO 1020
  102 CONTINUE
 1020 DO 1025 KK=1,NS
      KK2=2*KK-1
      X1=SPS(KK2)
      Y1=SPS(KK2+1)
      CALL CIRCLE(RPSN,M,X1,Y1,INCR)
      IF(INCR.EQ.1) GO TO 103
 1025 CONTINUE
      GO TO 104
  103 CONTINUE
      WRITE(6,200)
  200 FORMAT(1H1,'SOMETHING WRONG OVRLAP SUBROUTINE')
      STOP
  104 NRPTSN(NRPLSN)=M
      N2=2*M
```

```
      DO 1040 I=1,N2
1040  RPSIN(I+NSUM)=RPSN(I)
      NSUM=NSUM+N2
      RPSN(1)=RPS(NRN2)
      RPSN(2)=RPS(NRN2+1)
      K=KN
      DO 107 I=1,NS
      L=K-IFACT*(I-1)
      IF(L.GT.NS) L=1
      IF(L.LT.1) L=NS
      IF(L.EQ.1.AND.IFACT.EQ.-1) K=2-I
      IF(L.EQ.NS.AND.IFACT.EQ.1) K=NS+I-1
      L2=2*L-1
      M=I+1
      M2=2*M-1
      RPSN(M2)=SPS(L2)
      RPSN(M2+1)=SPS(L2+1)
      IF(L.EQ.K1) GO TO 108
107   CONTINUE
108   M=M+1
      M2=2*M-1
      RPSN(M2)=RPS(1)
      RPSN(M2+1)=RPS(2)
      NRPLSN=NRPLSN+1
      GO TO 115
110   M=NRN
115   NRPTSN(NRPLSN)=M
      N2=2*M
      DO 118 I=1,N2
118   RPSIN(I+NSUM)=RPSN(I)
      NSUM=NSUM+N2
120   CONTINUE
      RETURN
      END
```

```
      SUBROUTINE INTERC(POINTS,NPTS,X1,Y1,X2,Y2,X,Y,KL,IFAULT,
     1 IDOUBL,XALSO,YALSO)
      DIMENSION POINTS(1)
      DIMENSION IPTS(200),XINT(200),YINT(200)
      COMMON/TOLRS/TOLEQN,TOLSNT,TOLQPT,TOL,TOLCK1,TOLCK2,
     1 TOLCK4,DELT,TOLCIR,ANGST2,TOLPLT
      NINTC=0
      IFAULT=1
      DO 74 I=1,NPTS
      IP1=I+1
      IF(I.EQ.NPTS) IP1=1
      I2=2*I-1
      I2P1=2*IP1-1
      X3=POINTS(I2)
      Y3=POINTS(I2+1)
      X4=POINTS(I2P1)
      Y4=POINTS(I2P1+1)
      XMIN=X3
      XMAX=X3
      YMIN=Y3
      YMAX=Y3
      IF(X4.LT.X3) XMIN=X4
      IF(X4.GT.X3) XMAX=X4
      IF(Y4.LT.Y3) YMIN=Y4
      IF(Y4.GT.Y3) YMAX=Y4
      XMIN=XMIN-TOL/2.
      YMIN=YMIN-TOL/2.
      XMAX=XMAX+TOL/2.
      YMAX=YMAX+TOL/2.
      DEL1=X2-X1
      DEL2=X4-X3
      IF(ABS(DEL1).LT.TOL) GO TO 10
      SA1=(Y2-Y1)/DEL1
      SB1=Y1-SA1*X1
   10 IF(ABS(DEL2).LT.TOL) GO TO 20
      SA2=(Y4-Y3)/DEL2
      SB2=Y3-SA2*X3
   20 IF(ABS(DEL1).GE.TOL) GO TO 40
      IF(ABS(DEL2).GE.TOL) GO TO 30
      GO TO 74
   30 NINTC=NINTC+1
      XINT(NINTC)=X1
      YINT(NINTC)=SA2*X1+SB2
      IPTS(NINTC)=I
      GO TO 70
   40 IF(ABS(DEL2).GE.TOL) GO TO 50
      NINTC=NINTC+1
      XINT(NINTC)=X3
      YINT(NINTC)=SA1*X3+SB1
      IPTS(NINTC)=I
      GO TO 70
   50 DIFFA=SA1-SA2
```

```
      IF(ABS(DIFFA).LT.TOL) GO TO 74
      NINTC=NINTC+1
      XINT(NINTC)=(SB2-SB1)/DIFFA
      YINT(NINTC)=SA1*XINT(NINTC)+SB1
      IPTS(NINTC)=I
   70 CONTINUE
      CALL CHECK3(XMIN,XMAX,YMIN,YMAX,XINT(NINTC),YINT(NINTC),IBETW)
      IF(IBETW.EQ.1) IPTS(NINTC)=0
   74 CONTINUE
      IF(NINTC.GT.0) IFAULT=0
      IF(IFAULT.EQ.1) RETURN
      XMIN=X1
      XMAX=X1
      YMIN=Y1
      YMAX=Y1
      IF(X2.LT.X1) XMIN=X2
      IF(X2.GT.X1) XMAX=X2
      IF(Y2.LT.Y1) YMIN=Y2
      IF(Y2.GT.Y1) YMAX=Y2
      XMIN=XMIN-TOL/2.
      YMIN=YMIN-TOL/2.
      XMAX=XMAX+TOL/2.
      YMAX=YMAX+TOL/2.
      DO 80 I=1,NINTC
      IF(IDOUBL.EQ.0) GO TO 75
      IF(ABS(XINT(I)-XALSO).LT.TOL.AND.ABS(YINT(I)-YALSO).LT.
     1 TOL) IPTS(I)=0
   75 IF(XINT(I).LT.XMIN) IPTS(I)=0
      IF(XINT(I).GT.XMAX) IPTS(I)=0
      IF(YINT(I).LT.YMIN) IPTS(I)=0
      IF(YINT(I).GT.YMAX) IPTS(I)=0
   80 CONTINUE
      IFAULT=1
      DO 90 I=1,NINTC
      IF(IPTS(I).EQ.0) GO TO 90
      IF(IFAULT.EQ.0) GO TO 85
      IFAULT=0
      DIST=(XINT(I)-X1)**2+(YINT(I)-Y1) **2
      M=I
      GO TO 90
   85 DIST2=(XINT(I)-X1)**2+(YINT(I)-Y1)**2
      IF(DIST2.LT.DIST) M=I
      IF(M.EQ.I) DIST=DIST2
   90 CONTINUE
      IF(IFAULT.EQ.1) RETURN
      KL=IPTS(M)
      X=XINT(M)
      Y=YINT(M)
      RETURN
      END
```

```
      SUBROUTINE CLOSE(ARRAY,NPTS,X1,Y1,K)
      DIMENSION ARRAY(1)
      K=1
      DIST=(ARRAY(1)-X1)**2+(ARRAY(2)-Y1)**2
      IF(NPTS.EQ.1) RETURN
      DO 10 I=2,NPTS
      I2=2*I-1
      DIST2=(ARRAY(I2)-X1)**2+(ARRAY(I2+1)-Y1)**2
      IF(DIST2.LT.DIST)  K=I
   10 CONTINUE
      RETURN
      END
```

G LEVEL 21 CHECK1 DATE = 78102 10/47/48

```
      SUBROUTINE CHECK1(X1,Y1,ARRAY,N,ICOMP)
      DIMENSION ARRAY(1)
      COMMON/TOLRS/TOLEQN,TOLSNT,TOLQPT,TOLINT,TOL,TOLCK2,
     1 TOLCK4,DELT,TOLCIR,ANGST2,TOLPLT
      ICOMP=0
      DO 10 I=1,N
      I2=2*I-1
      X=ARRAY(I2)
      Y=ARRAY(I2+1)
      IF(ABS(X-X1).LT.TOL.AND.ABS(Y-Y1).LT.TOL) GO TO 15
   10 CONTINUE
      RETURN
   15 ICOMP=1
      RETURN
      END
```

```
G LEVEL  21                 CHECK2            DATE = 78102          10/47/48

          SUBROUTINE CHECK2(X1,Y1,ARRAY,NPLS,NPTAR,ICOMP)
          DIMENSION ARRAY(1),NPTAR(1)
          COMMON/TOLRS/TOLEQN,TOLSNT,TOLQPT,TOLINT,TOLCK1,TOL,
         1 TOLCK4,DELT,TOLCIR,ANGST2,TOLPLT
          ICOMP=0
          NSUM=0
          DO 20 L=1,NPLS
          NPTS=NPTAR(L)
          DO 10 I=1,NPTS
          K2=NSUM+2*I-1
          X=ARRAY(K2)
          Y=ARRAY(K2+1)
          IF(ABS(X1-X).GE.TOL) GO TO 10
          IF(ABS(Y1-Y).GE.TOL) GO TO 10
          ICOMP=1
          RETURN
   10     CONTINUE
          NSUM=NSUM+2*NPTS
   20     CONTINUE
          RETURN
          END
```

```
      SUBROUTINE CHECK3(XMIN,XMAX,YMIN,YMAX,X,Y,IBETW)                  00018290
      IBETW=0                                                           00018300
      IF(X.LT.XMIN) IBETW=1                                             00018310
      IF(X.GT.XMAX) IBETW=1                                             00018320
      IF(Y.LT.YMIN) IBETW=1                                             00018330
      IF(Y.GT.YMAX) IBETW=1                                             00018340
      RETURN                                                            00018350
      END                                                               00018360
```

```
      SUBROUTINE CHECK4(RPS,NR,SPS,NS)
      DIMENSION RPS(1),SPS(1)
      COMMON/TOLRS/TOLEQN,TOLSNT,TOLOPT,TOLINT,TOLCK1,TOLCK2,
     1 TOL,DELT,TOLCIR,ANGST2,TOLPLT
      DO 30 I=1,NR
      I2=(I-1)*2+1
      I2P2=I2+2
      IF(I.EQ.NR) I2P2=1
      XR1=RPS(I2)
      YR1=RPS(I2+1)
      XR2=RPS(I2P2)
      YR2=RPS(I2P2+1)
      ISWTCH=1
      IF(ABS(XR2-XR1).LE.TOL) ISWTCH=2
      IF(ABS(YR2-YR1).LE.TOL) ISWTCH=3
      IF(ISWTCH.NE.1) GO TO 15
      ASLOPE=(YR2-YR1)/(XR2-XR1)
      BINT=YR1-ASLOPE*XR1
      AINSL=-1./ASLOPE
   15 DO 20 J=1,NS
      J2=(J-1)*2+1
      XS1=SPS(J2)
      YS1=SPS(J2+1)
      GO TO (16,17,18), ISWTCH
   16 XS1L=(YR1-YS1+AINSL*XS1-ASLOPE*XR1)/(AINSL-ASLOPE)
      YS1L=YR1+ASLOPE*(XS1L-XR1)
      DIST=SQRT((XS1L-XS1)**2+(YS1L-YS1)**2)
      IF(DIST.GT.TOL) GO TO 20
      ALPHA=ATAN(AINSL)
      XS1P=XS1L+DELT*COS(ALPHA)
      YS1P=YS1L+DELT*SIN(ALPHA)
      CALL CIRCLE(RPS,NR,XS1P,YS1P,INCR)
      IF(INCR.EQ.0) GO TO 160
      XS1P=XS1L-DELT*COS(ALPHA)
      YS1P=YS1L-DELT*SIN(ALPHA)
  160 SPS(J2)=XS1P
      SPS(J2+1)=YS1P
      GO TO 20
   17 IF(ABS(XS1-XR2).GT.TOL) GO TO 20
      XS1P=XS1+DELT
      YS1P=YS1
      CALL CIRCLE(RPS,NR,XS1P,YS1P,INCR)
      IF(INCR.EQ.0) GO TO 160
      XS1P=XS1-DELT
      GO TO 160
   18 IF(ABS(YS1-YR2).GT.TOL) GO TO 20
      YS1P=YS1+DELT
      XS1P=XS1
      CALL CIRCLE(RPS,NR,XS1P,YS1P,INCR)
      IF(INCR.EQ.0) GO TO 160
      YS1P=YS1-DELT
      GO TO 160
```

```
   20 CONTINUE                                                00018890
   30 CONTINUE                                                00018900
      RETURN                                                  00018910
      END                                                     00018920
```

```
      SUBROUTINE CIRCLE(POINTS,NPTS,XC,YC,INCR)
      DIMENSION POINTS(1)
      COMMON/TOLRS/TOLEQN,TOLSNT,TOLQPT,TOLINT,TOLCK1,TOLCK2,
     1 TOLCK4,DELT,TOL1,ANGST2,TOLPLT
      NPC=0
      NNC=0
      DO 10 I=1,NPTS
      IP1=I+1
      IF(I.EQ.NPTS) IP1=1
      L=(I-1)*2
      LP1=(IP1-1)*2
      DISX1=POINTS(L+1)-XC
      DISY1=POINTS(L+2)-YC
      DISX2=POINTS(LP1+1)-XC
      DISY2=POINTS(LP1+2)-YC
      IF(ABS(DISX1).LT.TOL1.AND.ABS(DISY1).LT.TOL1) GO TO 20
      IF(ABS(DISX2).LT.TOL1.AND.ABS(DISY2).LT.TOL1) GO TO 20
      IF(ABS(DISX1).GE.TOL1) GO TO 3
      IF(ABS(DISX2).GE.TOL1) GO TO 1
      IF((DISY1/DISY2).GT.0.0) GO TO 10
      GO TO 20
    1 IF(ABS(DISY2).GE.TOL1) GO TO 2
      X=DISX2
      GO TO 8
    2 IF(ABS(DISY1-DISY2).LT.TOL1) GO TO 10
      GO TO 5
    3 IF(ABS(DISY1).GE.TOL1) GO TO 32
      IF(ABS(DISX2).LT.TOL1) GO TO 10
      IF(ABS(DISY2).GE.TOL1) GO TO 10
      IF((DISX1/DISX2).GT.0.0) GO TO 10
      GO TO 20
   32 IF(ABS(DISX2).GE.TOL1) GO TO 34
      GO TO 36
   34 IF(ABS(DISY2).GE.TOL1) GO TO 36
      X=DISX2
      GO TO 8
   36 IF(ABS(DISY2-DISY1).LT.TOL1) GO TO 10
      IF(ABS(DISX2-DISX1).GE.TOL1) GO TO 5
      IF((DISY1/DISY2).GT.0.0) GO TO 10
      X=DISX2
      GO TO 8
    5 SA=(DISY2-DISY1)/(DISX2-DISX1)
      SB=DISY1-SA*DISX1
      X=-SB/SA
      IF(X.LT.DISX1.AND.X.LT.DISX2) GO TO 10
      IF(X.GT.DISX1.AND.X.GT.DISX2) GO TO 10
    8 IF(ABS(X).LT.TOL1) GO TO 20
      IF(X.LT.0.0) NNC=NNC+1
      IF(X.GT.0.0) NPC=NPC+1
   10 CONTINUE
      INCR=0
      IF(2*(NPC/2).EQ.NPC) RETURN
```

```
      IF(2*(NNC/2).EQ.NNC) RETURN                                       00019450
      INCR=1                                                            00019460
      RETURN                                                            00019470
   20 INCR=2                                                            00019480
      RETURN                                                            00019490
      END                                                               00019500
```

```
      SUBROUTINE AREA(X,Y,NPTS,YINTG)
      DIMENSION X(1),Y(1)
      XLOW=X(1)
      XHIGH=XLOW
      KMIN=1
      KMAX=1
      DO 10 I=2,NPTS
      IF(X(I).GE.XLOW) GO TO 5
      KMIN=I
      XLOW=X(I)
    5 IF(X(I).LE.XHIGH) GO TO 10
      KMAX=I
      XHIGH=X(I)
   10 CONTINUE
      IF(KMIN.EQ.KMAX) GO TO 70
      L1=KMIN
      L2=KMAX
      IF(KMAX.LT.KMIN) L2=NPTS+KMAX
      NTABS=L2-L1
      YINTG=0.
      DO 20 L=1,NTABS
      K1=L1+L-1
      IF(K1.GT.NPTS) K1=K1-NPTS
      K2=L1+L
      IF(K2.GT.NPTS) K2=K2-NPTS
      DX=X(K2)-X(K1)
   20 YINTG=YINTG+(DX/2.)*(Y(K1)+Y(K2))
      L2=KMAX
      IF(KMAX.GT.KMIN) L2=KMAX-NPTS
      NTABS=L1-L2
      DO 30 L=1,NTABS
      K1=L1-L+1
      IF(K1.LT.1) K1=K1+NPTS
      K2=L1-L
      IF(K2.LT.1) K2=K2+NPTS
      DX=X(K2)-X(K1)
   30 YINTG=YINTG-(DX/2.)*(Y(K1)+Y(K2))
      YINTG=ABS(YINTG)
      RETURN
   70 YLOW=Y(1)
      YHIGH=YLOW
      DO 80 I=2,NPTS
      IF(Y(I).LT.YLOW) YLOW=Y(I)
      IF(Y(I).GT.YHIGH) YHIGH=Y(I)
   80 CONTINUE
      YINTG=YHIGH-YLOW
      RETURN
      END
```

```
      SUBROUTINE PLOTOL(DATAC,DATAS,MS,TITLES,GAMMA,APLOT,BPLOT,          00019990
     1 VPROBL,IPLTOL)                                                     00020000
      DIMENSION IPLTOL(1)                                                 00020010
      DIMENSION DATAC(1),DATAS(1),MS(1),TITLES(1),APLOT(1),BPLOT(1)       00020020
      DIMENSION XPR(10),OUT(91),SYMBOL(9)                                 00020030
      DATA BLANK,PERIOD,FI/1H ,1H.,1HI/                                   00020040
      DATA SYMBOL/1HA,1HB,1HC,1HD,1HE,1HF,1HG,1HK,1HM/                    00020050
      DIMENSION HEAD(9)                                                   00020060
      WRITE(6,101) (TITLES(I),I=1,80)                                     00020070
  101 FORMAT(1H1,80A1)                                                    00020080
      WRITE(6,209)                                                        00020090
      WRITE(6,102) GAMMA,DATAC(4),DATAC(5)                                00020100
      ALOW=DATAC(16)                                                      00020110
      AHIGH=DATAC(17)                                                     00020120
      BHIGH=DATAC(19)                                                     00020130
      BLOW=DATAC(18)                                                      00020140
      DELX=(BHIGH-BLOW)/90.                                               00020150
      DELY=(AHIGH-ALOW)/20.                                               00020160
      KPRINT=5                                                            00020170
      NPANEL=DATAC(23)+0.5                                                00020180
      NPSI=DATAC(9)+0.5                                                   00020190
      DPSI=DATAC(11)                                                      00020200
       PSI=DATAC(10)-DPSI                                                 00020210
      DO 20 I=1,NPSI                                                      00020220
      PSI=PSI+DPSI                                                        00020230
   20 HEAD(I)=PSI                                                         00020240
      TY2=AHIGH+DELY/2.                                                   00020250
      DO 140 I=1,21                                                       00020260
      TY1=TY2-DELY                                                        00020270
      DO 30 J=1,91                                                        00020280
   30 OUT(J)=BLANK                                                        00020290
      IF(KPRINT.EQ.5) OUT(1)=FI                                           00020300
      IF(KPRINT.NE.5) OUT(1)=PERIOD                                       00020310
      IF(KPRINT.EQ.5) OUT(91)=FI                                          00020320
      IF(KPRINT.NE.5) OUT(91)=PERIOD                                      00020330
      IF(I.NE.1.AND.I.NE.21) GO TO 50                                     00020340
      L=9                                                                 00020350
      DO 40 J=1,91                                                        00020360
      L=L+1                                                               00020370
      OUT(J)=PERIOD                                                       00020380
      IF(L.EQ.10) OUT(J)=FI                                               00020390
   40 IF(L.EQ.10) L=0                                                     00020400
   50 CONTINUE                                                            00020410
      MAS=0                                                               00020420
      DO 90 K=1,NPANEL                                                    00020430
      DO 60 J=1,NPSI                                                      00020440
      DO 75 L=1,4                                                         00020450
      MAS=MAS+1                                                           00020460
      IF(APLOT(MAS) .GT.TY2) GO TO 75                                     00020470
      IF(APLOT(MAS) .LE.TY1) GO TO 75                                     00020480
      IF(IPLTOL(MAS).EQ.1) GO TO 75                                       00020490
      TX2=BLOW+DELX/2.                                                    00020500
```

```
      DO 55 M=1,91
      TX1=TX2-DELX
      IF(BPLOT(MAS).LT.TX2.AND.BPLOT(MAS).GE.TX1) GO TO 58
   55 TX2=TX2+DELX
   58 OUT(M)=SYMBOL(J)
   75 CONTINUE
   60 CONTINUE
   90 CONTINUE
      YPLOT=TY2-DELY/2.
      IF(KPRINT.EQ.5) WRITE(6,201) YPLOT,OUT,YPLOT
      IF(KPRINT.NE.5) WRITE(6,205) OUT
      IF(KPRINT.EQ.5) KPRINT=0
      KPRINT=KPRINT+1
  140 TY2=TY2-DELY
      XPR(1)=BLOW
      DO 150 I=2,10
  150 XPR(I)=XPR(I-1)+10.*DELX
      WRITE(6,204)
      WRITE(6,202) XPR
      WRITE(6,207)
      WRITE(6,217) VPROBL
  217 FORMAT(1H0,105X,'PROBABILITY:',F6.3)
      WRITE(6,210)
      DO 160 L=1,4
      K=9-NPSI+L
      IF(K.LE.4) WRITE(6,211) SYMBOL(L),HEAD(L),SYMBOL(L+5),HEAD(L+5)
      IF(K.GT.4.AND.K.LE.9) WRITE(6,212) SYMBOL(L),HEAD(L),SYMBOL(L+5)
      IF(K.GT.9) WRITE(6,213) SYMBOL(L),SYMBOL(L+5)
  160 CONTINUE
      IF(NPSI.LT.5) WRITE(6,215) SYMBOL(5)
      IF(NPSI.GT.5) WRITE(6,216) SYMBOL(5),HEAD(5)
      WRITE(6,214)
  210 FORMAT(///1H ,22X,76('*')/1H ,22X,'*',74X,'*'/1H ,22X,'*',2X,
     1 'KEY TO PLOT SYMBOLS',53X,'*'/1H ,22X,'*',74X,'*'/1H ,22X,
     2 '*',4X,'SYMBOL',5X,'A/C HEADING (DEG)',10X,'SYMBOL',5X,
     3 'A/C HEADING (DEG)',4X,'*')
  211 FORMAT(1H ,22X,'*',7X,A1,12X,F7.2,18X,A1,12X,F7.2,9X,'*')
  212 FORMAT(1H ,22X,'*',7X,A1,12X,F7.2,18X,A1,28X,'*')
  213 FORMAT(1H ,22X,'*',7X,A1,37X,A1,28X,'*')
  214 FORMAT(1H ,22X,'*',74X,'*'/1H ,22X,'*',74X,'*'/1H ,22X,76('*'))
  215 FORMAT(1H ,22X,'*',7X,A1,66X,'*')
  216 FORMAT(1H ,22X,'*',7X,A1,12X,F7.2,47X,'*')
  102 FORMAT(1H0,'SUN ELEVATION',F12.2/1H ,'A/C PITCH ATTITUDE',
     1 F7.2/1H ,'A/C ROLL ATTITUDE',F8.2//1H ,'OBSERVER ANGLE',93X,
     2 'OBSERVER ANGLE'/1H ,3X,'DEGREES',100X,'DEGREES'/)
  204 FORMAT(/)
  202 FORMAT(1H ,9X,10F10.3)
  207 FORMAT(/,38X,'GLINT AZIMUTH WITH RESPECT TO SUN - DEGREES')
  201 FORMAT(1H ,F10.3,5X,91A1,1X,F10.3)
  205 FORMAT(1H ,15X,91A1)
  209 FORMAT(1H0,50X,'SUN GLINT SIGNATURE')
      RETURN
```

G LEVEL 21	PLOTOL	DATE = 78102	10/47/48
END			00021030

```
      SUBROUTINE DRPLOT(DATAC,DATAS,MS,       GAMMA,ALPHA2,BETA2,
     1 INTRFL,ISHADW,INTERF,XPLOT,YPLOT,IBUF,JCONT,DWORKS,DWKSP2,VPROBL)
      DIMENSION DATAC(1),DATAS(1),MS(1),TITLES(1),ALPHA2(1),BETA2(1),
     1 XPLOT(1),YPLOT(1),IBUF(1),INTRFL(1),ISHADW(1),INTERF(1)
      DIMENSION DWORKS(1),DWKSP2(1)
      IZPTS=0
      ICONT=1
      JCONT=JCONT+1
      IRFLTN=DATAC(3)+0.5
      THETA=DATAC(4)
      PHI=DATAC(5)
      NPANEL=DATAC(23)+0.5
      NPSI=DATAC(9)+0.5
      IALPL=DATAC(16)+0.5
      IF(DATAC(16).LT.0.) IALPL=DATAC(16)-0.5
      IDAL=(DATAC(17)-DATAC(16))/2.+0.5
      IBET=DATAC(18)+0.5
      IF(DATAC(18).LT.0.) IBET=DATAC(18)-0.5
      IDBET=(DATAC(19)-DATAC(18))/6.+0.5
      BETL=IBET
      DBT=IDBET
      ALPL=IALPL
      DAL=IDAL
      MAS=0
      DPSI=DATAC(11)
      DO 90 I=1,NPANEL
      K=MS(I)
      NPTS=DATAS(K)+0.5
      PSI=DATAC(10)-DPSI
      DO 60 J=1,NPSI
      PSI=PSI+DPSI
      MPTS=0
      DO 75 L=1,NPTS
      MAS=MAS+1
      IF(IRFLTN.NE.INTRFL(MAS)) GO TO 75
      MPTS=MPTS+1
      XPLOT(MPTS)=BETA2(MAS)
      YPLOT(MPTS)=ALPHA2(MAS)
   75 CONTINUE
      IF(MPTS.EQ.0) GO TO 60
      CALL SORT(XPLOT,YPLOT,MPTS,DATAC(17),DATAC(16),DWKSP2)
      IF(MPTS.EQ.0) GO TO 60
      CALL SORT2(XPLOT,YPLOT,MPTS,MPTS1,MPTS2,DWORKS,DWKSP2)
      IF(MPTS2.EQ.0) GO TO 77
      CALL SORT(YPLOT,XPLOT,MPTS1,DATAC(19),DATAC(18),DWKSP2)
      IF(MPTS1.EQ.0) GO TO 20
      CALL GPLOT(ALPL,DAL,GAMMA,THETA,PHI,PSI,MPTS1,ICONT,XPLOT,YPLOT,
     1          IBUF,JCONT,BETL,DBT,VPROBL,IZPTS)
      ICONT=0
   20 CONTINUE
      DO 76 KKK=1,MPTS2
      LML=(KKK-1)*2
```

```
      XPLOT(KKK)=DWORKS(LML+1)
   76 YPLOT(KKK)=DWORKS(LML+2)
      MPTS=MPTS2
   77 CONTINUE
      CALL SORT(YPLOT,XPLOT,MPTS,DATAC(19),DATAC(18),DWKSP2)
      IF(MPTS.EQ.0) GO TO 60
      CALL GPLOT(ALPL,DAL,GAMMA,THETA,PHI,PSI,MPTS,ICONT,XPLOT,YPLOT,
     1          IBUF,JCONT,BETL,DBT,VPROBL,IZPTS)
      ICONT=0
   60 CONTINUE
   90 CONTINUE
      IF(ICONT.EQ.0) RETURN
      IZPTS=1
      CALL GPLOT(ALPL,DAL,GAMMA,THETA,PHI,PSI,MPTS,ICONT,XPLOT,YPLOT,
     1          IBUF,JCONT,BETL,DBT,VPROBL,IZPTS)
      RETURN
      END
```

```
      SUBROUTINE SORT(XPLOT,YPLOT,MPTS,AHIGH,ALOW,DWORKS)
      DIMENSION XPLOT(1),YPLOT(1),DWORKS(1)
      INTC=0
      LPTS=0
      DO 5 I=1,MPTS
      KPT=(I-1)*2
      DWORKS(KPT+1)=XPLOT(I)
    5 DWORKS(KPT+2)=YPLOT(I)
      DO 70 I=1,MPTS
      IP1=I+1
      IF(I.EQ.MPTS) IP1=1
      IFL1=2
      IFL2=2
      KPT=(I-1)*2
      KPT1=(IP1-1)*2
      X1=DWORKS(KPT+1)
      Y1=DWORKS(KPT+2)
      X2=DWORKS(KPT1+1)
      Y2=DWORKS(KPT1+2)
      IF(Y1.GT.AHIGH) IFL1=1
      IF(Y2.GT.AHIGH) IFL2=1
      IF(Y1.LT.ALOW) IFL1=3
      IF(Y2.LT.ALOW) IFL2=3
      IF(Y1.NE.Y2) RATIO=(X2-X1)/(Y2-Y1)
      GO TO (1,2,3), IFL1
    1 GO TO (11,12,13), IFL2
    2 GO TO (21,22,23), IFL2
    3 GO TO (31,32,33), IFL2
   11 IF(INTC.EQ.0) GO TO 60
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
      INTC=0
      GO TO 60
   12 IF(INTC.EQ.0) GO TO 120
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
      INTC=0
  120 LPTS=LPTS+1
      XPLOT(LPTS)=X1+RATIO*(AHIGH-Y1)
      YPLOT(LPTS)=AHIGH
      GO TO 60
   13 IF(INTC.EQ.0) GO TO 130
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
  130 LPTS=LPTS+1
      XPLOT(LPTS)=X1+RATIO*(AHIGH-Y1)
      YPLOT(LPTS)=AHIGH
      XSAVE=X1+RATIO*(ALOW-Y1)
      YSAVE=ALOW
```

```
      INTC=1
      GO TO 60
   21 IF(INTC.EQ.0) GO TO 210
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
  210 LPTS=LPTS+1
      XPLOT(LPTS)=X1
      YPLOT(LPTS)=Y1
      XSAVE=X1+RATIO*(AHIGH-Y1)
      YSAVE=AHIGH
      INTC=1
      GO TO 60
   22 IF(INTC.EQ.0) GO TO 220
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
      INTC=0
  220 LPTS=LPTS+1
      XPLOT(LPTS)=X1
      YPLOT(LPTS)=Y1
      GO TO 60
   23 IF(INTC.EQ.0) GO TO 230
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
  230 LPTS=LPTS+1
      XPLOT(LPTS)=X1
      YPLOT(LPTS)=Y1
      XSAVE=X1+RATIO*(ALOW-Y1)
      YSAVE=ALOW
      INTC=1
      GO TO 60
   31 IF(INTC.EQ.0) GO TO 310
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
  310 LPTS=LPTS+1
      XPLOT(LPTS)=X1+RATIO*(ALOW-Y1)
      YPLOT(LPTS)=ALOW
      XSAVE=X1+RATIO*(AHIGH-Y1)
      YSAVE=AHIGH
      INTC=1
      GO TO 60
   32 IF(INTC.EQ.0) GO TO 320
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
      INTC=0
  320 LPTS=LPTS+1
      XPLOT(LPTS)=X1+RATIO*(ALOW-Y1)
      YPLOT(LPTS)=ALOW
```

```
      GO TO 60
   33 IF(INTC.EQ.0) GO TO 60
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
      INTC=0
   60 IF(INTC.EQ.0) GO TO 70
      IF(I.LT.MPTS) GO TO 70
      LPTS=LPTS+1
      XPLOT(LPTS)=XSAVE
      YPLOT(LPTS)=YSAVE
   70 CONTINUE
      MPTS=LPTS
      RETURN
      END
```

```
      SUBROUTINE SORT2(XPLOT,YPLOT,MPTS,MPTS1,MPTS2,DWORKS,DWKSP2)
      DIMENSION XPLOT(1),YPLOT(1),DWORKS(1),DWKSP2(1)
      COMMON/TOLRS/TOLEQN,TOLSNT,TOLAPT,TOLINT,TOLCK1,TOLCK2,
     1 TOLCK4,DELT,TOLCIR,ANGST2,TOLPLT
      MPTS2=0
      IF(MPTS.EQ.1) RETURN
      BMIN=XPLOT(1)
      BMAX=BMIN
      DO 62 I=2,MPTS
      IF(XPLOT(I).LT.BMIN) BMIN=XPLOT(I)
      IF(XPLOT(I).GT.BMAX) BMAX=XPLOT(I)
   62 CONTINUE
      IF(BMIN.GE.0.0) RETURN
      IF(BMAX.LE.0.0) RETURN
      DO 64 I=1,MPTS
      IF(ABS(XPLOT(I)).LE.45.) RETURN
   64 CONTINUE
      BAVG=(BMAX-BMIN)/2.
      IF(BAVG.LT.ANGST2) RETURN
      DO 30 I=1,MPTS
      LPS=(I-1)*2
      DWORKS(LPS+1)=XPLOT(I)
      DWORKS(LPS+2)=YPLOT(I)
      IF(XPLOT(I).LT.0.0) XPLOT(I)=XPLOT(I)+360.
   30 CONTINUE
      MPTS1=MPTS
      CALL SORT(YPLOT,XPLOT,MPTS1,180.,0.,DWKSP2)
      DO 35 I=1,MPTS1
      LPS=(I-1)*2
      DWKSP2(LPS+1)=XPLOT(I)
   35 DWKSP2(LPS+2)=YPLOT(I)
      DO 40 I=1,MPTS
      LPS=(I-1)*2
      XPLOT(I)=DWORKS(LPS+1)
      YPLOT(I)=DWORKS(LPS+2)
      IF(XPLOT(I).GT.0.) XPLOT(I)=XPLOT(I)-360.
   40 CONTINUE
      DO 45 I=1,MPTS1
      LPS=(I-1)*2
      DWORKS(LPS+1)=DWKSP2(LPS+1)
   45 DWORKS(LPS+2)=DWKSP2(LPS+2)
      MPTS2=MPTS1
      MPTS1=MPTS
      CALL SORT(YPLOT,XPLOT,MPTS1,0.,-180.,DWKSP2)
      RETURN
      END
```

```
      SUBROUTINE GPLOT(ALPL,DAL,SUNELV,THAC,PHAC,HEAD,NPTS,ICONT,
     1 XPLOT,YPLOT,      IBUF,JCONT,BETL,DBT,VPROBL,IZPTS)
      DIMENSION XPLOT(1),YPLOT(1),IBUF(1)
      CALL FACTOR(.7857)
      IF(ICONT.EQ.0)GO TO 10
      GO TO(50,20,20,60,20,20,60,20,20,60,20,20),JCONT
   50 CALL PLOT(2.,1.,-3)
      CALL PLOT(-2.,-1.,3)
      CALL PLOT(8.8,-1.,2)
      CALL PLOT(8.8,13.,2)
      CALL PLOT(-2.,13.,2)
      CALL PLOT(-2.,-1.,2)
      GO TO 30
   20 CALL PLOT(0.,4.,-3)
      GO TO 30
   60 CALL PLOT(12.,-8.,-3)
      CALL PLOT(-2.,-1.,3)
      CALL PLOT(8.8,-1.,2)
      CALL PLOT(8.8,13.,2)
      CALL PLOT(-2.,13.,2)
      CALL PLOT(-2.,-1.,2)
   30 CONTINUE
C********  DRAW AXIS  ******
      CALL AXIS(0.,0.,16HOBSERVER AZIMUTH,-16,6.,0.,BETL,DBT)
      CALL AXIS(0.,0.,21HELEVATION OF OBSERVER,21,2.,90.,ALPL,DAL)
      CALL PLOT(0.,1.,3)
      CALL PLOT(6.,1.,2)
      CALL PLOT(6.,0.,3)
      CALL PLOT(6.,2.,2)
      CALL PLOT(0.,2.,2)
      CALL GRID(.01,.01,1.,1.,6,2)
      CALL SYMBOL(5.,2.3,0.10,12HPROBABILITY ,0.,11)
      CALL NUMBER(999.,999.,0.10,VPROBL,0.,3)
      IF(IZPTS.EQ.1) GO TO 19
   10 CONTINUE
      XPLOT(NPTS+1)=XPLOT(1)
      YPLOT(NPTS+1)=YPLOT(1)
      XPLOT(NPTS+2)=BETL
      XPLOT(NPTS+3)=DBT
      YPLOT(NPTS+2)=ALPL
      YPLOT(NPTS+3)=DAL
      ND=NPTS+1
      CALL LINE(XPLOT,YPLOT,ND,1,0,4)
      IF(HEAD.LT.0.) GO TO 15
      AMAX=YPLOT(1)
      LMAX=1
      DO 12 I=2,NPTS
      IF(YPLOT(I).GT.AMAX) LMAX=I
      IF(LMAX.EQ.I) AMAX=YPLOT(LMAX)
   12 CONTINUE
      AMAX=(YPLOT(LMAX)-ALPL)/DAL+0.05
      BMAX=(XPLOT(LMAX)-BETL)/DBT
```

```
      CALL NUMBER(BMAX,AMAX,0.07,HEAD,0.,-1)                              00023900
      GO TO 19                                                            00023910
   15 AMIN=YPLOT(1)                                                       00023920
      LMIN=1                                                              00023930
      DO 17 I=2,NPTS                                                      00023940
      IF(YPLOT(I).LT.AMIN) LMIN=I                                         00023950
      IF(LMIN.EQ.I) AMIN=YPLOT(LMIN)                                      00023960
   17 CONTINUE                                                            00023970
      AMIN=(YPLOT(LMIN)-ALPL)/DAL-0.05                                    00023980
      BMIN=(XPLOT(LMIN)-BETL)/DBT                                         00023990
      CALL NUMBER(BMIN,AMIN,0.07,HEAD,0.,-1)                              00024000
   19 CONTINUE                                                            00024010
      IF(ICONT.EQ.0) GO TO 40                                             00024020
      CALL SYMBOL(1.8,2.1,0.10,25HHEADING OF AIRCRAFT (DEG),0.,25)        00024030
      CALL SYMBOL(0.,3.0,.10,22HSUN ELEVATION ANGLE = ,0.,22)             00024040
      CALL NUMBER(999.,999.,.10,SUNELV,0.,0)                              00024050
      CALL SYMBOL(0.,2.8,.10,16HA/C PITCH ATT = ,0.,16)                   00024060
      CALL NUMBER(999.,999.,.10,THAC,0.,1)                                00024070
      CALL SYMBOL(0.,2.6,.10,15HA/C ROLL ATT = ,0.,15)                    00024080
      CALL NUMBER(999.,999.,.10,PHAC,0.,1)                                00024090
      IF(((JCONT-1)/3)*3.EQ.(JCONT-1)) CALL SYMBOL(3.4,3.4,               00024100
     1 0.14,19HSUN GLINT SIGNATURE,0.,19)                                 00024110
   40 RETURN                                                              00024120
      END                                                                 00024130
```

```
      SUBROUTINE GRID(XORG,YORG,DELVLS,DELHLS,NVSPS,NHSPS)
      DYMAX=NHSPS*DELHLS
      DXMAX=NVSPS*DELVLS
      XMAX=XORG+DXMAX
      YMAX=YORG+DYMAX
      NVLS=NVSPS+1
      NHLS=NHSPS+1
      XPRES=XORG
      YPRES=YORG
      DO 10 I=1,NVLS
      CALL PLOT(XPRES,YPRES,3)
      FACT=(-1)**(I+1)
      YPRES=YPRES+FACT*DYMAX
      CALL PLOT(XPRES,YPRES,2)
      XPRES=XPRES+DELVLS
      CALL PLOT(XPRES,YPRES,3)
   10 CONTINUE
      XPRES=XORG
      YPRES=YORG
      DO 20 I=1,NHLS
      CALL PLOT(XPRES,YPRES,3)
      FACT=(-1)**(I+1)
      XPRES=XPRES+FACT*DXMAX
      CALL PLOT(XPRES,YPRES,2)
   20 YPRES=YPRES+DELHLS
      RETURN
      END
```